

## December 1986





# Why you must buy YAESU equipment from us!

Read the reviews, study the features/benefits and you'll soon be convinced (if you're not already) of the 'giant-leap' recently made by YAESU engineers, with their latest products.

**But, why buy YAESU from us?**  
**A good question — read on and we'll give you a good answer!**

YAESU's total dedication and patience in harnessing of advanced technology have produced equipment of such brilliant, innovative design, using the highest quality professional engineering standards that one 'almost' hesitates to just call it 'amateur-radio'.

We have spent hours studying, discussing, and reading the manuals and talking with the YAESU people. We also operate the equipment regularly so we've gained first-hand experience of its performance and most important, its versatility.

It's our pleasure to pass that information on to you with our 'Hands-on' product 'teach-in'. We want you to derive the maximum benefit from the equipment. We've put it 'through its paces' and we'd like to sit down and answer any questions you may have about what these remarkable new radios are capable of.

Take the FT 767 GX for example. We'll give you easy to understand 'how', 'what', 'when' and 'why' explanations of its 6 unique features (viz TX Shift, Tone Encoder, Twin VFO's with auto-tracking, RF Amplifier, HF/VHF/UHF/coverage, and Auto SWR/Power Meter), and don't feel embarrassed because the RAE doesn't cover some of these breakthroughs!

If you wish we'll go through in detail, one by one, the no less than 71 buttons, switches, knobs, plugs or controls on the front panel and the 25 on the back!

The same 'Teach-in' service applies to the entire YAESU range or for that matter all equipment in stock, but while we're on the subject of YAESU — here are the other latest additions to the family:



## FL 7000 — The Shape of Things to Come

A new concept in convenience, control and reliability  
 1.2kW P.E.P. HF Solid State QSK Linear

- Weight only 30kg (66lbs)
- 160m through 10m
- Auto tuning and band changing
- Integral P.S.U.

The Linear with everything

## YAESU's super portable twins FT 290 & FT 690 Mk II

- 2 metres • 6 metres
- ... destined for even greater success — available now!
- 'New look' front panel
- Completely new rig with optional 25W p.a. for mobile use, and lots, lots more!
- Super new additions and changes to the world's biggest ever selling amateur transceiver.

## FT 727 R Dual Band Handle . . . YAESU's experience and patience pays off — they succeeded where others failed

- 2m and 70cms FM Handle
- Hit 'hard-to-reach' repeaters with a punchy 5W plus a wealth of CMOS microprocessor controlled commands
- 20 keys/40 channels
- CAT system • Liquid Crystal meter



**FULL IMPORTER WARRANTY ON ALL YAESU PRODUCTS.**

The Staff of Amcomm-ARE and Amateur Electronics wish you a Happy Christmas and Prosperous New Year . . . with YAESU of course!

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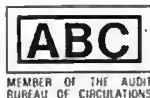
Technical articles on subjects of amateur interest are always welcome and should be sent to: The Editor, *Radio Communication*, Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JE.

All articles received are reviewed for technical merit by the RSGB Technical & Publications Committee, or an acknowledged expert on the subject, before acceptance. Payment at high competitive rates will be made for all articles published.

A contribution will only be considered for publication on the understanding that the person submitting it is the original author and owner of the whole copyright, and that on acceptance for publication such copyright will become the property of the RSGB in consideration of the above-mentioned payment by the RSGB to the contributor.

The editor will be pleased to send intending authors a manuscript preparation guide and to give any other advice and assistance requested.

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GREAT BRITAIN 1986

# a new general coverage receiver, the R5000.



The R5000 is a new general coverage receiver. It offers the dedicated short wave listener and radio amateur a receiver that will match the performance of the best transceivers available today.

The R5000's frequency range is continuous from 100 kHz to 30 MHz and its modes of operation are USB, LSB, CW, AM, FM and FSK. An optional VHF converter (VC20) extends the frequency range to include 108 to 174 MHz.

The R5000 uses 2SK 125 junction-type FETs in the high sensitivity direct balanced first mixer resulting in outstanding two signal characteristics and a substantially improved noise floor level.

Operating from either 12 V DC or 240 V AC the receiver can be used both in the home or whilst out in car, caravan or boat.

The receiver has two rates of tuning for each mode selected by a front panel switch. The frequency increments for SSB/CW/FSK are 10 Hz and 100 Hz, for AM 100 Hz and 1 kHz and for FM 2.5 kHz and 5 kHz.

Both low (50 ohms) and high (500 ohms) aerial connections are provided on the rear panel of the R5000. The required aerial can be selected by means of a front panel switch. Information on which aerial to be used with a stored frequency can also be held in memory.

The R5000 has 100 memory channels which store frequency, mode and which of the two aerial connections has been

selected. Information is easily transferred from one VFO to the other, from memory to VFO and in order to quickly access your favourite station, from VFO to any of the memories. Both memory scan and frequency scan (between frequencies in memories 8 and 9) are included in the receiver. Halt on an occupied channel whilst scanning can either be timed or until the signal drops. The entire one hundred memories can also be quickly scrolled to check the data held and to find the location of an empty channel.

To enhance reception, IF shift and a tunable notch filter are part of the R5000 receiver. Filter selection according to mode is automatic when the front panel selectivity switch is set to AUTO. This selection can, of course, be overridden. Additionally, the introduction of optional SSB and CW filters (YK88SN for SSB and either YK88C or YK88CN for CW) will improve the already excellent signal to noise ratio and selectivity. The optional YK88A-1 AM filter will improve the shape factor and enhance reception even further.

The R5000 general coverage receiver also has keyboard frequency entry, dual mode noise blanker, two 24 hour clocks with timer, option VS1-voice synthesizer and CW tone mode indication for the blind operator, a large 100 mm diameter top mounted speaker, switchable AGC (fast or slow), RF attenuation (10, 20 or 30 dB steps) and a F.LOCK switch which protects against frequency shift if the VFO knob is accidentally moved.

All prices subject to confirmation

## LOWE ELECTRONICS LTD.

Chesterfield Road, Matlock, Derbyshire DE4 5LE  
Telephone 0629 2817, 2430, 4057, 4995.

822



send £1 for complete mail order catalogue.

RADIO COMMUNICATION December 1986



## TR751E

There has been a TRIO two metre multi-mode mobile transceiver for the last six years. Beginning with the successful TR9000 and continuing with the TR9130, amateurs have always found the series to be reliable and above all easy to operate, especially whilst mobile. Advances in technology have enabled TRIO to further improve on the TR9130. The result is the TR751E, a new generation of multi-mode mobile transceiver.

The TR751E is the first multi-mode mobile transceiver that can be set to select the correct mode whilst scanning the band. By setting the rig to vfo and selecting AUTO mode before pressing the SCAN button, the TR751E will move up or down the band changing both mode and step rate according to the band plan.

The transceiver has two VFO's and 10 memory channels. Memory held information on both frequency and mode of operation is easily transferred to either vfo.

The TR751E can be set to scan between user programmed limits or around them depending on the frequency set when the scan is started. When AUTO mode is set the transceiver will select the correct mode as it scans.

Operating on 13.8 volts DC, power output from the transceiver is 25 watts (high) and approximately 5 watts (low). The low power setting applies to all modes.

The TR751E is perfect for base station use. When operating on SSB, signals can easily be found using the frequency step set to 5 kHz, fine tuning quickly achieved by switching to the 50 Hz rate. Operation is also ideal on FM, the rig stepping in either 12.5 or 5 kHz steps. Full repeater facilities are also available including reverse repeater. Receiver performance is excellent, our first sample amazed us, FM, 0.14uV for 12dB SINAD and SSB, 0.09uV for 10dB S + N/N.

As an option, the TR751E can be fitted with DCL. Compatible with the DCS system, DCL (Digital Channel Link) enables your rig to automatically QSY to an open channel.

For the blind operator the TRIO TR751E is perfect. As each mode is selected a tone gives the appropriate morse letter (F for FM, U for USB, etc) and when fitted with the optional VSI board, a digitally encoded girl's voice will announce on request the operating frequency.

In addition, the TR751E has an illuminated analogue S/R meter, all mode squelch, MHz select keys, a noise blanker, semi break-in CW with side tone, RIT, memory channel up/down keys and a frequency lock. A mobile mount and up/down microphone are also included with the transceiver.

TR751E..... £580.70 inc VAT, carriage £7.00  
MU1 (DCL modem) £28.95 inc VAT, carriage £7.00

## NEW from TRIO, a 45 watt fm mobile.....



The TRIO TM2550E is a high power 2 metre FM mobile transceiver.

Power output from the TM2550E is 45 watts. Current drain is approximately 9.5 amps in the high power position (45 watts) and approximately 3 amps in the low power position (5 watts). Low power can be adjusted up to 40 watts. Power requirement of the transceiver is 13.8 volts DC.

Frequency selection is easy using the back-lit front panel keypad. The selected frequency is displayed on a backlit LCD together with

additional operating information, eg priority channel, reverse repeater, simplex or repeater shift etc.

The TM2550E has 23 memory channels into which frequencies are easily written. The TM2550E automatically selects simplex or repeater mode in accordance with the band plan. This function is easily overridden by using the "OS" key.

Scanning operations are divided into keyboard, memory and priority scan. Frequency hold on an occupied channel can be either "time" or "carrier" operated.

As an option, the TM2550E can be fitted with the DCS system, DCL (Digital Channel Link) enables your rig to automatically QSY to an open channel. The DCL system searches for an open channel (checks the next eleven 25kHz spaced frequencies above a user designated one), remembers it, returns to the original frequency and transmits control information to the other DCL equipped station that switches BOTH rigs to the clear channel.

TM2550..... £435.37 inc VAT, carriage £7.00.  
MU1 DCL unit. £28.95 inc VAT, carriage £1.00.

All prices subject to confirmation

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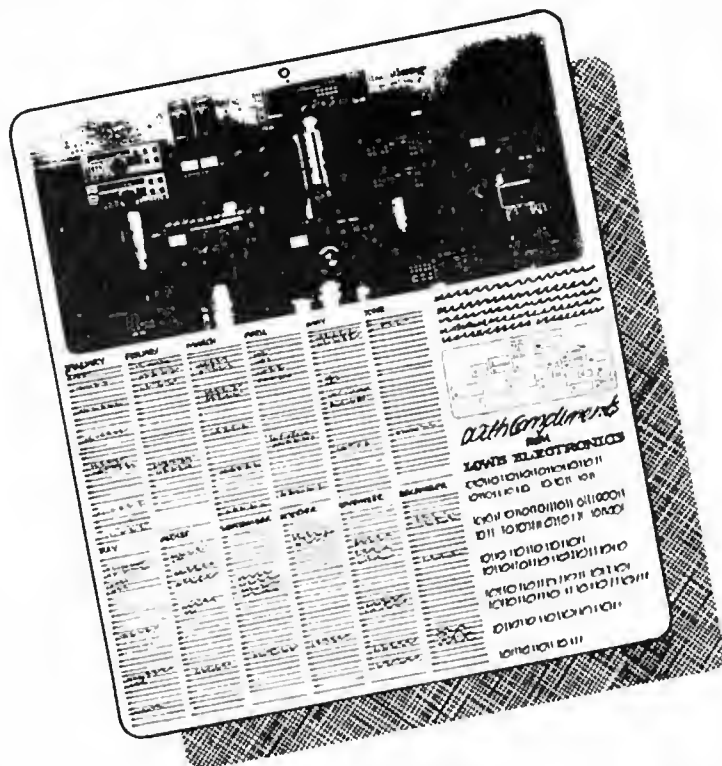
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data communications  
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## LOWE SHOPS

### In Glasgow.

the shop manager is Sim, GM3SAN,  
the address, 4/5 Queen Margaret Road, off Queen Margaret Drive,  
Glasgow, 041-945 2626

### In the North East.

the shop manager is Hank, G3ASM,  
the address, 56 North Road, Darlington, 0325 486121.

### In Cambridge.

the shop manager is Tony, G4NBS,  
the address, 162 High Street, Chesterton, Cambridge, 0223 311230.

### In Cardiff.

the shop manager is Carl, GW0CAB,  
the address, c/o South Wales Carpets, Clifton Street, Cardiff, 0222 464154.

### In London.

the shop manager is Andy, G4DHQ,  
the address, 223/225 Field End Road, Eastcote, Middlesex, 01-429 3256.

### In Bournemouth.

the shop manager is Colin, G3XAS,  
the address, 27 Gillam Road, Northbourne, Bournemouth, 0202 577760.

Although not a shop, there is on the South Coast a source of good advice and equipment, John, G3JYG. His address is Abbotsley, 14 Grovelands Road, Hailsham, East Sussex. An evening or weekend call will put you in touch with him. His telephone number is 0323 848077.

**LOWE ELECTRONICS SHOPS** are open from 9.00am to 5.30pm Tuesday to Friday and from 9.00am to 5.00pm on Saturday. Shop lunch hours vary and are timed to suit local needs. For exact details, please telephone the shop manager.

All prices subject to confirmation

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# ICS

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PK-232



FAX-1

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Now, PACKET, AMTOR, RTTY, CW, ASCII transceive in one compact, intelligent terminal unit. Works with any computer equipped with an RS232 interface. Incorporates a no compromise HF Modem, with an 8 pole bandpass filter followed by a limiter/discriminator with auto threshold correction. The correct bandwidth is automatically chosen for the mode selected. A front panel switch allows selection between two transceivers. No more switching cables when moving from HF to VHF. All code conversion is taken care of by the internal Z-80A processor. Built-in tuning indicator. 12 volt D.C. power requirement. User friendly application programs/interface cables available for many popular personal computers.

**ALL YOU WILL EVER NEED FOR AMATEUR DATA COMMUNICATION!**

PK-232 ONLY £269.95 inc VAT (£3.50 p&p)



ALM  
203/E

**ALINCO**



**ELH-24B  
Amplifier**

## Unbeatable value in 2 metre hand held transceivers!

A fully programmable 3 watts output 2 metre FM transceiver. Marine band RX coverage, and a FREE 30 WATT AMPLIFIER/ GaAs FET PRE-AMPLIFIER. LCD display. 16 key control panel. 10 memory channels. Antenna. Belt clip. Carrying strap. NI-CAD BATTERY PACK INCLUDED. Optional range of accessories, including leatherette case; speaker/microphone; mobile charger mount etc, etc. The value for money is just unbeatable, as hundreds of satisfied UK users will testify!

ALM-203E £269.95 (£4.00 p&p)  
ALR-206E £249.95 (£2.50 p&p)  
(25 watt 2 metre mobile with similar features to above)

FAX-1a  
PRINTER



## New HF Fax Receiver price breakthrough!

UK designed and produced, you can now obtain weather maps, press photographs and satellite cloud cover detail on any Epson FX-80 compatible computer printer with amazing clarity. Do not confuse with other products offering only a low resolution screen display. They do not even come close to the FAX-1 in image clarity. Built-in tuning indicator. All standard R.P.M. and I.O.C. rates. Fully automatic operation (including START; RPM, IOC selection). 1:1 picture aspect ratio. 12v D.C. power requirement. Built-in tuning indicator. Built-in clock and timer. Battery powered compatible printer available for Marine, mobile applications. Needs only audio from an HF receiver and a suitable printer to operate. **PRINT QUALITY COMPARABLE TO PROFESSIONAL UNITS AT ONE FIFTH THE PRICE!**

Send for details and print sample.

FAX-1 ONLY £269.95 inc VAT (£3.50 p&p)

FAX-1A (portable printer) £425.00 inc VAT (£4.50 p&p)

AMT-2 AMTOR/RTTY/CW/ASCII

Terminal unit still available £245.00 plus £2.50 p&p

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# ICOM

## VHF/UHF FM Handportables.

If you want a handheld with exceptional features, quality built to last and a wide variety of interchangeable accessories, take a look at the ICOM range of FM transceivers. All ICOM handhelds come with an IC-BP3 nicad battery pack, flexible antenna, AC wall charger, belt clip, wrist strap and personal earpiece as standard.

### **IC-2E/4E, 2 metre and 70cm thumbwheel handportable.**

These popular handhelds from ICOM are still available. For those Amateurs who require a simple but effective FM transceiver the IC-2E and 4E take some beating. Frequency selection is by means of thumbwheel switches (with 5kHz up-switch) and duplex or simplex facility. Power output is 1.5 watts or 150 milliwatts (2.5 watts possible with IC-BP5A battery pack).

### **IC-02E/04E 2 metre and 70cm keypad handportable.**

These direct-entry CPU controlled handhelds utilize a 16-button keypad allowing easy access to frequencies, memories, memories and scanning. Ten memories store frequency and offset. Three scanning systems, priority, memory and programmable band scan, (the IC-02E now with an improved CPU retains duplex offset). These handhelds have an LCD readout indicating frequency, memory channel, signal strength, transmitter output and scanning functions. Power output is 3 watts or 0.5 watt in low power position for the IC-02E and 2.5 watts or 0.5 watt for the IC-04E. (5 watts is possible with the IC-BP7 battery pack or external 13.8V.DC.)

### **IC-12E 23cm Keypad Handportable.**

The IC-12E has a 16 button Keypad allowing direct access to frequencies, scanning and memories. Ten memory channels store operating frequency as well as simplex/duplex and duplex offset. A priority function allows another frequency such as a repeater or calling frequency to be monitored. The IC-12E is equipped with a 1750Hz tone generator for repeater access. Frequency coverage 1260-1299.9875MHz with 5 frequency step rates. An internal power module provides 1 watt or low 100mW as standard.

Also available for ICOM handhelds are a large range of optional extras including a variety of rechargeable nicad power packs, dry-cell battery pack, desk charger, headset and boom mic, speaker mic, leatherette cases and mobile mounting brackets.

For more information on these handportables and other ICOM Amateur equipment contact your local authorised ICOM dealer or Thanet Electronics Ltd.



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# Seasons Greetings to ICOM users the world over

## **NEW! IC-MICRO TWO, Mini-handportable.**

This is the smallest handportable transceiver from ICOM. The MICRO-TWO, 2 metre FM measures only 148 x 61 x 31mm. with BP22 battery pack (not shown here). The MICRO-TWO is a hand-size transceiver which will equally fit most pockets.

On the top panel a clear LCD readout gives frequency and memory channel number. Tuning is made easy using up/down toggle switches to select 1MHz, 100kHz or 12.5kHz steps as well as the 10 memory channels. Full repeater and reverse duplex operation facilities are featured including repeater access tone. An automatic power saving function reduces battery power consumption when in receive mode. Output power is 1 watt or 100 milliwatts (low) with the BP22 nicad pack.

The ICOM MICRO-TWO is the ultimate in 2 metre miniature handheld transceivers, yet despite it's small size the receiver sensitivity and performance has not been compromised. This handy transceiver comes complete with the BP22 nicad pack (not shown here), A.C. wall charger, helical antenna. Most existing ICOM accessories can also be used.

An optional extra, the BC50 desk charger will rapidly charge the BP22 battery in just one hour. Other options include the BP23 long-life, low-power and BP24 medium-life, high-power nicad battery packs. Contact us or your local ICOM dealer for more details on this exciting new product.

**Actual Size Photograph.**  
This shows the non-standard low capacity battery pack. N.B. Standard battery pack is normally the higher capacity BP22 as mentioned in text.



Thalet ICOM Thalet ICOM Thalet ICOM Thalet ICOM Thalet ICOM Thalet ICOM Thalet ICOM Thalet ICOM Thalet ICOM

# BASE STATIONS

## IC-1271E, 1.2GHz Multimode Transceiver



ICOM, a pioneer in 1.2GHz technology are proud to introduce the first full feature 1240 – 1300 MHz base station transceiver. Features include: multimode operation, 32 memories, scanning and 10 watts RF output. The IC-1271E allows you to explore the world of 1.2GHz thanks to a newly developed PLL circuit that covers the entire band, a total of 60MHz, SSB, CW and FM modes may be used anywhere in the band making the IC-1271E ideal for mobile, DX, repeater, satellite or moonbounce operation. The IC-1271E has outstanding receiver sensitivity, the RF amplifiers use a low noise figure and high-gain disc type GaAs FET's

for microwave applications. The rugged power amplifier provides 10 Watts which can be adjusted from 1 to 10 Watts. A sophisticated scanning system includes memory scan, programme scan, mode-selective scan and auto-stop feature. Scanning of frequencies and memories is possible from either the transceiver or the HM12 scanning microphone. 32 programmable memories are provided to store the mode and frequency in 32 different channels. All functions including memory channel are shown clearly on a seven digit luminescent dual colour display. The IC-1271E has a dial-lock, noise blanker, RIT, AGC fast or slow and VOX functions. With a powerful 2 Watt audio output the IC-1271E is easily audible even in a noisy environment. The transceiver operates with either a 240V AC (optional) or 12 volt DC power supply.

**IC-AG1200 Masthead pre-amp.** Designed for use with the IC-1271E, the D.C. voltage and T/R switching for the amplifier is super-imposed on the R.F. coaxial cable and switched by the pre-amp switch on the IC-1271E front panel. The new pre-amp provides excellent performance as a low noise microwave amplifier (0.606 noise figure typical).

## IC-271 & 471 Multimode Base stations.

ICOM can introduce you to a whole new world via the world-communication satellite OSCAR. Did you know that you can Tx to OSCAR on the 430-440 MHz IC-471 and Rx on the 2m IC-271.

By making simple modifications, you can track the VFO's of the Rx and Tx either normally or reverse. This is unique to these ICOM rigs and therefore very useful for OSCAR 10 communications. Digital A.F.C. can also be provided for UOSAT etc. This will give automatic tracking of the receiver with digital readout of the doppler shift. The easy modifications needed to give you this unique communications opportunity are published in the December '84 issue of OSCAR NEWS. Back issues of OSCAR NEWS can be obtained from AMSAT (UK), LONDON E12 5EQ.

This range includes the IC-271E-10W, IC-271E-25W, 271H-100W and the 70cm versions IC-471E-25W and 471H-75W r.f. output. The 271E has an optional switchable front-end pre-amp. The 271H can use the pre-amp AG-25, with the 471E and 471H using the AG35 mast-head pre-amp. Other options include internal switch-mode PSU's: the 271E and 471E use the PS25 and the 271H and 471H use the PS35.



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## Into '87 with ICOM...

ICOM have been busy this year with new models all made to the high standard everyone has come to expect from a leading communications manufacturer. During 1987 the ICOM range of equipment will continue its upward trend in the design and production of sophisticated amateur radio equipment.

Also available a vast range of options and accessories to complete your station. So why not treat yourself this Christmas, no matter what your requirements ICOM probably have the answer.

### Power Supplies

	£ Retail Inc VAT
IC-PS15 External P.S.U. 20A	158.00
IC-PS25 Internal Switched Mode P.S.U. 8A (271E/471E/1271)	112.00
IC-PS30 External Systems P.S.U. 25A Continuous	343.85
IC-PS35 Internal Switched Mode P.S.U. 20A (751/745/271H/471H)	193.00
IC-PS45 External P.S.U. 8A (290/490 etc)	155.25
IC-PS55 External P.S.U. 20A (735)	185.00
IC-PS60 External P.S.U. General 30A	402.50

### Accessories for H.F.

IC-751A	
CR-64 High Stability Xtal	67.00
DCL D.C. Lead	7.00
EX-309 C.P.U. Interface Connector	48.00
EX-310 Voice Synthesizer	44.00
FL-32 9MHz CW/RTTY Filter 500Hz (not 751A)	54.00
FL-33 9MHz A.M. Filter 6kHz	42.00
FL-32A 455kHz CW/RTTY Filter 500Hz	104.00
FL-33A 455kHz CW/RTTY Filter 250Hz	104.00
FL-63 9MHz CW/RTTY Filter 250Hz	52.00
FL-70 9MHz SSB Wide Filter 2.8kHz	47.00
RC-10 Remote Frequency Controller	41.00

### IC-745/740

CR-64 High Stability Xtal	67.00
DCL D.C. Lead	7.00
EX-241 Marker Unit	21.00
EX-242 F.M. Unit	41.00
EX-243 Electronic Keyer Unit	57.00
FL-44A 455kHz SSB Filter 2.4kHz	104.00
FL-45 9MHz CW/RTTY Filter 500Hz	60.00
FL-52A 455kHz CW/RTTY Filter 500Hz	104.00
FL-53A 455kHz CW/RTTY Filter 250Hz	104.00
FL-54 9MHz CW/RTTY Filter 270Hz	51.00

### IC-735

EX-243 Electronic Keyer Unit	57.00
FL-32 9MHz CW/RTTY Filter 500Hz	54.00
FL-63 9MHz CW/RTTY Filter 250Hz	52.00
UT-30 Subaudible Tone Unit for F.M. (88.5Hz)	15.00

### IC-730

EX-195 Marker Unit	30.00
EX-202 LCA Unit for 2K/AT100/AT500	18.00
EX-203 CW Audio Filter	19.00
EX-205 Transverter Unit	19.00
FL-30 9MHz SSB Filter 2.3kHz	44.00
FL-44 455kHz SSB Filter 2.4kHz	106.00
FL-45 9MHz CW/RTTY Filter 500Hz	60.00
FL-54 9MHz CW Filter 270Hz	51.00

### IC-720A

FL-32 9MHz CW/RTTY Filter 500Hz	54.00
FL-34 10.7MHz AM Filter 6kHz	43.00
FL-63 9MHz CW/RTTY Filter 250Hz	52.00
FM-03 F.M. Unit	83.00

### Accessories for Rx

	£ Retail Inc VAT
IC-R7000 All 7000 Widespread Discourse Antenna 25 1300MHz	82.00
CK-70 D.C. Cable Kit	7.00
EX-310 Voice Synthesizer	44.00
RC-12 Remote Controller	62.00

### External Speaker

SP-3	61.00
IC-R71E/70	
CK-70 D.C. Cable Kit	7.00
EX-309 C.P.U. Interface Connector (R71E only)	48.00
EX-310 Voice Synthesizer	44.00
EX-257 F.M. Unit	41.00
FL-32 9MHz CW/RTTY Filter 500Hz	54.00
FL-33 9MHz AM Filter 6kHz (mode mod required)	42.00
FL-44A 455kHz SSB Filter 2.4kHz	104.00
FL-63 9MHz CW/RTTY Filter 250Hz	52.00
GC-5 World Clock	43.00
RC-11 Remote Controller (R71E only)	62.00
SP-3 External Speaker	61.00

### Accessories for VHF/UHF

IC-505	
EX-248 F.M. Unit	49.00
BP-10 Nicad Pack	79.00
IC-551/551D	
EX-106 F.M. Unit	148.00
EX-107 Vox Unit (fitted 551D)	65.00
EX-108 Pass Band Tune Unit (fitted 551D)	130.00

### IC-271E/H

AG-20 Internal Receive Pre-amp (271E only)	65.00
AG-25 Mast Head Pre-amp	82.00
EX-309 C.P.U. Interface Connector	48.00
EX-310 Voice Synthesizer	44.00
RPCB-271 Mutek Front End	94.90

### IC-27E/H & IC-47E

UT-16 Voice synthesizer	29.00
IC-28E/H	
UT-28 Digital Code Squelch Unit AQS	29.00
UT-29 Tone Squelch Unit	36.00

### IC-3200E

AH-32 Dual Band Mobile Antenna 145-430MHz	34.00
AH-32 Trunk Mount for above	32.20
UT-23 Voice Synthesizer	29.00

### IC-471E/H

AG-35 Mast Head Pre-amp	88.00
EX-309 C.P.U. Interface Connector	48.00
EX-310 Voice Synthesizer	44.00
IC-1271E	
AG-1200 Mast Head Pre-amp	83.00

### Accessories for Handportables

AQ2 Waterproof Bag for all ICOM Handhelds	14.38
BC-16F 240v Wall Charger (BP5A/BP7/BP8)	13.80
BC-25F 240v Wall Charger (BP3)	9.20
BC-26 240v Wall Charger 02E/04E (BP3)	7.60
BC-35F 240v Desk Charger all packs, fast & slow	70.15
BP-2 Battery Pack 7.2v/450mAh	44.85
BP-3 Battery Pack 8.4v/450mAh	29.90
BP-4 Empty Battery Case (6xAA cells)	9.20
BP-5 Battery Pack 10.8v/450mAh	60.95
BP-5A Battery Pack 10.8v/450mAh Inc charge socket	60.95
BP-7 Battery Pack 8.4v/800mAh	74.75
BP-8 12v charger lead cigarette plug BP3/7/8	71.30
CP-1 Battery Pack connecting cable	6.90
CP-10 12v battery pack connector cable	35.65
IX-1 12v/13v converter operate from 12v	17.25
IX-350 Bottom cap for 02E/04E	3.00
FL-EX 2m flexible 1/4 wave antenna (BNC)	6.00
FA-1 2m helical (screw)	8.05
FA-2 2m helical (BNC)	9.20
FA-3 70cm flexible 1/4 wave antenna (BNC)	9.20
ZSP1 BNC 70cm helical (BNC)	5.25

HM-9 Speaker Microphone	21.85
HS-10 Headset and Boom mic	20.70
HS-10SA Vox unit for HS10 (2E/04E only)	25.30
HS-10SB PTT switch box for HS10	20.70
LC-1 Leatherette case 2E/04E + BP5 (not 5A)	6.90
LC-2 Leatherette case 2E/04E + BP4	6.90
LC-3 Leatherette case 2E/04E + BP3	6.90
LC-11 Leatherette case 02E/04E + BP3	9.20
LC-12 Leatherette case 02E/04E + BP5 (not 5A)	9.20
LC-14 Leatherette case 02E/04E + BP5A/BP7/BP8	9.20
LC-18 Leatherette case 2E/04E + BP5A/BP8	9.20
HDCASE Heavy Duty Case	23.00
ML-1 10 watt booster for 2E	79.35
SS-1 Shoulder Strap	10.35

### Mobile Mounting Brackets

MB-202 For 202/402/215	14.95
MB-5 For 251/451/735	17.00
MB-6 For 240/280	12.65
MB-7 For 245	14.25
MB-9 For 290/490	17.00
MB-10 For 25/45/3200	17.00
MB-11 For 24G/22U	14.95
MB-12 For 870/1170/1000/740/745/271/471/1271	17.00
MB-16 Window Fitting 2E/02/4E/04	9.20
MB-16D Screw Fitting 2E/02/4E/04	8.05
MB-17 For 27E/47	17.00
MB-18 For 751/751A	17.00

### Microphones

	£ Retail Inc VAT
HM-5 600 ohm 4 pin noise cancelling	36.00
HM-7 1.3K ohm 8 pin 24G/730/720	19.00
HM-9 Speaker microphone for handportables	21.85
HM-10 1.3K ohm 8 pin Up/Down scanning	39.00
HM-11 1.3K ohm 8 pin Up/Down plus Tone Call	30.00
HM-12 600 ohm 8 pin Up/Down	22.00
HM-14 600 ohm 8 pin Up/Down DTMF	44.00
HS-15 600 ohm 8 pin Up/Down plus Tone Call	32.00
HS-15SB Boom mic and PTT switch box for mobiles	51.00
SM-5 1.3K ohm 8 pin Base Station	42.00
SM-6 600 ohm 8 pin Base Station	46.00
SM-8 1.3K 600 ohm selectable, 8 pin Base Station	82.00
SM-10 Comp. Graphic Equalizer Base Station	115.00

### Speakers

SP-3 Base Station Speaker 8 ohm	61.00
SP-4 Mobile Speaker 4 ohm with magnet	26.45
SP-7 Base Station Speaker	29.90
SP-8 Mobile Speaker 8 ohm with grip	23.00
SP-10 Mobile Speaker 8 ohm	34.50

### Station Accessories

BU-1 Memory backup for 290/490/25/45/27/47	32.00
D.C. Lead (1 pin)	7.00
D.C. Lead (4 pin)	6.90
D.C. Lead (2 pin)	9.20
CF-1 Cooling fan for PS-15/PS-20	31.00
EX-144 Cooling fan bracket for PS-15	6.00
CT-10 Computer interface terminal unit	380.00
World Clock	43.00
Service Manuals (no VAT)	10.00
User instruction books (no VAT)	2.50

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YAESU FT 770RH 70cm 25w FM high visibility display	495.00
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ICOM IC 490E all mode 70cms 10w/1w	617.00
ICOM 3200E 2m/70cm 25w each band	556.00
ICOM IC 47E 25w FM very small 9 memories	495.00

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YAESU FT 767 1.8MHz-430MHz. All mode gen cov rcvr	POA
YAESU FT ONE gen cov rcvr	POA
YAESU FT 980 gen cov rcvr inc AM/FM	1750.00
YAESU FT 757GX gen cov rcvr inc AM/FM/Keyer	949.00
ICOM IC 751A gen cov rcvr inc AM/FM/Keyer	1465.00
ICOM IC 745 gen cov rcvr	925.00
ICOM 735 gen cov rcvr inc AM/FM	929.00

## HF LINEAR AMPLIFIERS

YAESU FL 2100Z 160m to 10m	899.00
YAESU FL 7000 solid state integral PSU and ATU	1590.00
TOKYO HL 1K 1Kw amplifier	POA
TOKYO HL 1KGX new 1K linear	POA
TOKYO HL 2K new 2K linear	POA
TOKYO HL 3K 3Kw new linear	POA
ICOM IC 2KL/LPS.	1646.00

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YAESU FT 203R with FBA 5 battery case	225.00
YAESU FT 203R with FNB 3 nicad 2.7w	255.00
YAESU FT 203R with FNB 4 nicad 3.7w out	259.00
YAESU FT 203R with FBA 5 battery case 1.8w	269.00
YAESU FT 209R with FBA 5 battery case 2.7w	299.00
YAESU FT 209R with FNB 3 nicad 3.7w	305.00
YAESU FT 209R with FNB 4 nicad 3.7w	275.00
YAESU FT 209R with FBA 5 battery case	309.00
YAESU FT 209RH with FNB 3 nicad 3.7w	315.00
YAESU FT 209TH with FNB 3 nicad 5w	225.00
YAESU FT 209RH with FNB 4 nicad 5w	289.00
YAESU FT 209RH synthesised 1.5w 2m	275.00
ICOM IC 2E synthesised lcd display	289.00
ICOM IC 02E keypad entry lcd display 70cms	
ICOM IC 4E synthesised 1.5w 70cm	
ICOM IC 04E keypad entry lcd display 70cms	

FT 703R and FT 709R available same output spec as FT 203/209.

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YAESU FRG 8800 gen cov 150Khz-30Mhz large display, keyboard entry/free tuning	609.00
ICOM IC R71 100 Hz to 30Mhz passband tuning/notch filter, variable tuning rate	789.00
YAESU FRV 8800 converter module 118-179 for FRG 8800 range extension	100.00
AOR 2002 UHF/VHF 25Mhz-550Mhz and 800 Mhz-1300Mhz. STAR BUY	465.00
YAESU FRG 9600 UHF/VHF. Scanning receiver all mode 100 mem. Now up to 950Mhz	499.00
ICOM R700 Scanning lcvr 25-2000 Mhz 99 memories all mode	919.00
FDK ATC 720 airband rcvr handheld 720 channels	189.00
FDK RX 40 141-180 Mhz handheld rcvr	159.00
JIL SX 400 UHF/VHF rcvr inc PSU	598.00

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TONO 5000E CW RTTY ASCII and AMTOR c/w 5' high res monitor	POA
Range of 50 Mhz equipment both YAESU and ICOM in stock.	

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YAESU FT 290R as above with Mutek	POA
YAESU FT 270R 25w FM	379.00
YAESU FT 270RH 45w FM with lan	445.00
YAESU FT 2700RH 2m/70cms 25w each band full duplex	399.00
ICOM IC 290D 25w all mode	515.00
ICOM IC 27E 25w FM 9 mem.	379.00
ICOM IC 27H 45w FM 9 mem.	419.00
FDK M750XX 2m all mode 20w	449.00
FDK M725X 2m FM 25w	279.00

## VHF BASE STATIONS

YAESU FT 726R/2M all 726 options available	949.00
ICOM 271E multi mode 25w 32 mem	799.00
ICOM IC 271E/H multi mode 100w	979.00

## UHF BASE STATIONS

YAESU FT 726 70cms multimode — all 726 options	949.00
ICOM 471 E 25w multimode 70cms	889.00
ICOM 471 H high power multimode (75w) — 70cms	1099.00
ICOM 1271 E multimode 1240-1300 Mhz	1099.00

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HL82V 2m 10w in nom 85w, typ 100w out	145.95
HL110V 2m 10w in 110w out	250.95
HL35 2m Gaasfet preamp 5.5w in 35w out	86.25
HL30V 2m 5.3w in 30w out	56.70
HL20U 70cms Gaasfet preamp 2w in 30w out	89.25
HL30U 70cms Gaasfet preamp 1.15w in 60w out	126.00
HL60U 70cms Gaasfet preamp 12w in 100w out	225.75
HL120U 70cms Gaasfet preamp	418.95
HRA 2 2m mast preamp, Gaasfet	105.00
HRA 7 70cms mast preamp, Gaasfet	105.00

### BNOS

LPM 144-1-100 2m c/w preamp 1w for 100w out	197.50
LPM 144-1-100 2m c/w preamp 10w for 100w out	175.00
LPM 144-3-100 2m c/w preamp 3w for 100w out	197.50
LPM 144-3-100 2m c/w preamp 25w for 160w out	250.00
LPM 144-25-160 2m c/w preamp 3w for 180w out	290.00
LPM 144-3-180 2m c/w preamp 10w for 180w out	290.00
LPM 144-3-180 2m c/w preamp 3w for 50w out	125.00
LPM 144-10-180 2m c/w preamp 10w for 50w out	125.00
LP 144-10-50 2m c/w preamp 1w for 50w out	230.00
LP 144-10-50 2m c/w preamp 3w for 50w out	235.00
LPM 432-1-50 70cm c/w preamp 1w for 100w out	195.00
LPM 432-3-50 70cm c/w preamp 3w for 100w out	329.00
LPM 432-10-50 70cm c/w preamp 10w for 100w out	
LPM 432-10-100 70cm c/w preamp	

MICROWAVE MODULES range also available, call for details or literature on above.

## ANTENNA COUPLERS

AMCOMM 9000 coax, random wire, tuned feeders 100w	89.00
CAPCO SPC 300C 1Kw antenna coupler	188.37
CAPCO SPC 3000C 3Kw antenna coupler	279.42
CAPCO SPC 300M 1Kw module only	103.09
CAPCO SPC 3000M 3Kw module only	132.18
CAPCO SPC 3000M 3Kw module with SWR/power meter	115.00
TOKYO HC 200 8 band 200w pep with SWR/power meter	199.00
TOKYO HC 400 9 band 350w pep with SWR/power meter	399.00
TOKYO HC 2000 9 band 2Kw pep	85.00
TOKYO HC 2000 9 band 2Kw pep	345.00
WELZ AC 383.5-30Mhz 200w	485.00
ICOM AT 100 100w auto antenna coupler	339.00
ICOM AT 500 500w auto antenna coupler	59.00
YAESU FC 757GX auto antenna coupler	
YAESU FRT 7700 receiver antenna tuner	

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HEIL HC3 Mic element Yaesu/Trio	22.85
HEIL HC5 Mic element Icom SM5/6	25.40
HEIL HM5 Desk Mic (300Hz-3KHz) cardioid	65.00
HEIL MM5 handheld Mic with HC3	29.00
HEIL SS2 Speaker special comms spkr	59.00
HEIL BM10 lightweight headset/boom mic	65.00

## POWER SUPPLIES

YAESU FP 757HD 20A	239.00
YAESU FP 757 GX 20A	169.00
YAESU FP 700 20A	195.00
BNOS 12/6amp	69.00
BNOS 12/12amp	115.00
BNOS 12/25amp	169.00
BNOS 12/40amp	340.00
BNOS professional range also available on request	POA
ICOM IC PS 35 switch mode	193.00
ICOM PS 15 20amp external	158.00
ICOM IC PS 55 20amp	185.00
ICOM IC2 KLPS to match IC2KL linear	429.00
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DRAE 6 amp	63.00
DRAE 12 amp	86.50
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HK 706 manual	23.00
HK 707 manual	22.25
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HK 803 manual solid brass	99.00
MK 702 single lever paddle	29.95
MK 703 twin paddle squeeze heavy base	37.15
MK 704 twin lever without base	20.00
MK 705 twin paddle squeeze marble base	32.20
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KENPRO KP 200 squeeze paddle: keyer multi memory	179.00
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# MAIL ORDER



### Trio

TS40HS	NEW Amateur Band Transceiver	P&P
AT1440	General coverage Rx	998.00
PS50	Auto ATU 80-10M	135.48
TS440S	Heavy duty PSU for TS440S	198.00
AT1440	9 Band 1X General Cov Rx	1895.00
SP430	Auto ATU 150 10 Metres	228.08
TS430S	Speaker with filters	81.89
TS430S	9 Band 1X General Cov Rx	1595.00
TS430S	160m 10m Transceiver 9 Bands	381.59
AT230	All Band ATU/Power Meter	185.98
SP230	External Speaker Unit	56.03
TS103P	160m 10m Transceiver	843.82
TS430S	160m 10m Transceiver	867.68
PS430	Matching Power Supply	151.48
SP230	Matching Speaker	39.50
MR430	Mobile Mounting Bracket	14.78
FM130	FM Board for TS430	45.00
VS88A	6kHz AM Filter	46.18
VS88C	500Hz CW Filter	43.10
VS88CN	270Hz CW Filter	51.11
VS88S	2.4kHz SSB Filter	44.34
VS88S	1.8kHz SSB Filter	43.71
SP120	Base Station External Speaker	36.33
MC50	Dual Impedance Desk Microphone	43.10
MC35S	Fast Microphone 50k ohm ICP	20.33
MC60A	Deluxe desk mic with preamp	77.60
MC80	Desk mic with audio compensation	95.45
MC30S	Up/Down mic for 6 pin Trio	19.07
MC47S	Up/Down mic for 8 pin Trio	19.70
MC55	Mobile mic with control box	49.27
FM201A	HF Low Pass Filter 1kW	322.68
MC1E	2M Mini Handhelds	199.00
MC4E	70cm Mini Handhelds	240.79
MC7E	2M Base Stations	839.96
TS811E	70cm Base Stations	998.00
TS8300	70cm Handheld	353.48
TS6000	New 2M FM Synthesised Handheld	328.00
MC2E	Base Station	72.05
B12	Dry battery case for 12H2E/41E	11.09
DC1	DC power supply for 12H2E/41E	23.40
MC1	Headset unit with vox	30.80
PB21	Headset unit for 12H2E/41E	22.79
PB21H	High capacity head for 12H2E/41E	30.18
B24	Desk charger/PSU for 12H2E/41E	94.21
SCB	Soft case for 12H2E/41E	11.09
MC33	Speaker mic for 12H2E/41E/2600/3600	26.47
AD1	Screwed phone to BNC adapter for 12H2E/41E	3.95
MS1	Mobile Stand, Charger	41.88
MS100	Synthesised 200kHz 30MHz Receiver	565.32
MS5	Deluxe Headphones	32.02
SP40	Mobile External Speaker	19.70
NEW	160/10M 2x4 linear	1350.00
TR151E	2M Multimeter with DCL (mobile)	580.70
TR1	OCL option for TR151E	28.95

### Linear Amps

MICROWAVE MODULES	inc preamp (1/3w i/p)	94.30	(2.00)
MM144/30-LS	inc preamp, switchable	126.95	(2.50)
MM144/50-S	inc preamp (10w i/p)	149.95	(2.50)
MM144/100-S	inc preamp (25w i/p)	159.95	(2.50)
MM144/100-HS	inc preamp (1/3w i/p)	169.95	(2.50)
MM144/100-LS	inc preamp (3/10/25 i/p)	334.65	(2.50)
MM144/200S	inc preamp (1/3w i/p)	169.02	(2.00)
MM144/320L	inc preamp (10w i/p)	149.50	(2.00)
MM144/320S	linear (10w i/p)	334.65	(2.50)
B.N.O.S.			
LPW 144-1-100	2m 1W in, 100W out preamp	197.50	(2.50)
LPW 144-3-100	2m 3W in, 100W out preamp	197.50	(2.50)
LPW 144-10-100	2m 10W in, 100W out preamp	197.50	(2.50)
LPW 144-25-160	2m 25W in, 160W out preamp	255.00	(2.50)
LPW 144-3-180	2m 3W in, 180W out preamp	255.00	(2.50)
LPW 144-10-180	2m 10W in, 180W out preamp	255.00	(2.50)
LPW 144-3-50	2m 3W in, 50W out preamp	125.00	(2.50)
LPW 144-10-50	2m 10W in, 50W out preamp	235.00	(2.50)
LPW 432-1-50	70cm 1W in, 50W out preamp	235.00	(2.50)
LPW 432-3-50	70cm 3W in, 50W out preamp	235.00	(2.50)
LPW 432-10-50	70cm 10W in, 50W out preamp	195.00	(2.50)
LPW 432-10-100	70cm 10W in, 100W out preamp	335.00	(2.50)

### SWR/PWR Meters

WELZ	1 B-150MHz PWR/SWR	42.95	(1.50)
SP10X	1 B-150MHz PWR/SWR/PEP	98.00	(1.50)
SP220	1 B-200MHz PWR/SWR/PEP	63.95	(1.50)
SP225	1 B-200MHz PWR/SWR/PEP	127.95	(2.00)
SP420	140-525MHz PWR/SWR/PEP	82.00	(1.50)
SP425	140-525MHz PWR/SWR/PEP	129.00	(2.00)
SP475	1 B-200/430-450/800-930/1240-1300MHz	189.00	(2.00)
DAWA Power and SWR METERS			
CN410M	3.5-150 MHz mobile cross needle meter	61.72	(1.50)
CN460M	140-150MHz mobile cross needle meter	65.40	(1.50)
CN630	140-150MHz mobile cross pointer meter up to 200W	108.90	(2.50)
NS448	900-1300MHz swr/power meter 5.20W	86.60	(1.50)

1 B-150MHz PEP Cross Needle Meter up to 1.5kW	115.00	(2.00)
1600 Power and SWR METERS		
SW160A	SWR/power meter 1 B-150MHz	46.81
SW100R	SWR/power meter 140-450MHz	46.81
SW200A	SWR/power/PEP meter 1 B-150MHz	98.50
SW200R	SWR/power/PEP meter 140-450MHz	98.50
SW210R	SWR/power/PEP meter 1 B-54MHz up to 2W	109.62
SW61	Optional coupler for SW200	27.72
SW62	Optional coupler for SW200	27.72
SW63	2W HF coupler for SW200A/B	32.65
SW64	23cm coupler for SW200A/B	43.10
VHF Receivers		
AGR/062	VHF/UHF continuous coverage scanner	487.30
FRG900	60-950MHz scanning receiver	575.00
W-2000	Handheld VHF/UHF scanner	269.00
R537S	Handheld Airband receiver	69.51
R537	Mobile/Base/Portable Airband receiver	274.05
from RT000	75-1000 + 1025-2000MHz scanner all mode	957.00

### Icom Products

IC2514	HF Transceiver	1405.00
IC275	4m HF Transceiver	949.00
PS19	P.S. Unit	158.00
PS30	Systems p.s.u. 25A	343.85
SM6	Base microphone for 7m/70cm	46.00
IC2900	2m 2W M. Mode	542.00
IC4900	70cms multimode mobile 10W	617.00
CR7	General Coverage Receiver	189.00
IC02E	2m H/Field	299.00
IC04E	70cm handheld	299.00
BC15	Base Charger	70.15
IC09	Speaker mic	21.85
LC11	case for IC2E, IC4E + HP3	9.20
ICB3	Sho. Battery Pack	29.90
BPS	High Power Battery Pack	60.95
CH	Car Charging Lead	8.90
DE1	1/2 Adapter	17.25
IC3700	2M/70cm Mobile Transceiver	556.00
IC505	50MHz multimode 10W U.V. r	349.00
IC6M	10m mobile (NEW)	399.00
IC6B	FM mobile 25W	359.00
NEW		
IC48E	25W 70cm FM mobile	449.00
Micro two	2m handheld, LCO display but 70cm	259.00

### Sony

Sony 200FD	150KHz-30MHz, 76-108MHz, 108-136MHz 22 memories AM/SSB/FM broadcast/Airband	329.95
Sony 7600D	150KHz-30MHz, 76-108MHz 10 memories AM/SSB/FM broadcast receiver	179.95
Sony Air 7	108-136MHz, 144-174MHz 76-108MHz + 1W/MW/SW superb handheld receiver	249.95

### CW Equipment

BENCHER			
BV1	Squeeze Key, Black base	67.42	(2.00)
RV2	Squeeze Key, Chrome base	76.97	(2.00)
H.MOUND MORSE KEYS			
HK208	Straight key	21.82	(2.00)
HK702	Deluxe version of above on Marble Base	43.30	(3.00)
HK706	Straight key	21.80	(2.00)
HK707	Straight key	20.15	(2.00)
MK704	Squeeze paddle	20.25	(2.00)
MK705	Squeeze paddle on Marble Base	32.78	(3.00)
KEYERS & ACCESSORIES			
Star Master Key	Electronic keyer	54.70	(3.00)
NEW Star	Masterkey electronics CMOS memory keyer	95.00	(1.00)
TRX3	Morse Oscillator	13.65	(2.00)
Orac	Morse Tutor	32.00	(2.00)
OTO	Dabing Morse Tutor	56.50	(3.00)

### Yaesu

FT750A	HF Transceiver	969.00
FT750	Auto A.T.U.	349.00
FT750T	Heavy Duty PSU	239.00
FT750G	Switched Mode P.S.U.	199.00
MMB11	Mobile Bracket	37.50
YC1	Charger	10.50
CS1A	Carrying Case	6.50
YH43P	20m j/wave	12.50
YH43H	Speaker/Mike	22.00
YH43	2M handheld c/w FN84 micad	309.00
FT200R	70cm H/Field	319.00
FT200R	2m 25W F.M.	399.00
FTQ-H900	60-950MHz scanning receiver	525.00
MTM110	Mobile Bracket	10.00
FT7N	Charger	10.35

PA8	Car Adapter/Charger	20.50
PA10	10 BV read pack for FT209/709	40.00
PA14	12 BV read pack for FT209/709	45.00
M244	Speaker/Mike	27.00
11776R	2m Base Station	999.00
430/126	70cm Module for above	349.00
FR8800	HF Receiver	639.00
FR8800	Converter 118-125 for above	100.00
MM188	Hand 600 8pm mic	20.00
MD188	Desk 600 8pm mic	79.00
MA1A3B	Boom mobile mic	25.00
YH12	Lightweight phones	19.50
YH15	Padded Mobile H/Set Boom mic	19.00
YH2	Lightweight Mobile H/Set Boom mic	19.00
SR1	Headset and boom mic for FT209/709	19.00
SR1	PTT Switch Box 208/708	21.00
SR1	PTT Switch Box 290/790	18.00
SR1	PTT Switch Box 270/700	21.00
SR1	World Time Clock	39.00

NEW			
FT767GA	HF Gen Coverage Trans with optional VHF/UHF/GM modules	1550 00	1
FT7000	Solid state linear with built in auto ATU	1600 00	1
FT277G	Full band handheld transceiver 144-150MHz & 430-440MHz up in 5W on each band	425 00	1
FT290R	MW 2M multimode portable	429 00	1
FT230R FN010	NW 2M multimode handheld 5W	249 00	12 00
FT73JR FN810	NW 70cms multimode handheld 5W	269 00	12 00

### Power Supplies

DRAE			B.N.O.S		
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6 amp	63 00	(2 50)	12 amp	115 00	(3 00)
12 amp	86 50	(3 00)	75 amp	169 00	(4 00)
74 amp	125 00	(4 00)	40 amp	345 00	(4 00)

### Aerial Rotators

AR1002	Lightweight VHF rotator	52.95
KR400	Med H Duty	129.00
KR500	6 core Levitation	139.95
KR400RC	5 core Medium Duty	159.95
KR600RC	6 core Heavy Duty	209.95
Danwa 750P	Heavy duty rotator	290.32

### Switches

Sigma	2 way 50239	17.50
Sigma	2 way n. SxTs	22.95
Welz CH20A	2 way coax switch (SU239)	30.75
Welz CH20N	2 way coax switch (N type)	54.00
Drae	3 way 50239	15.40
Drae	3 way n. SxTs	19.90

### Aerials

JAYBEAM			
Jaybeam	TR3 Mx3 HF 3 element Tri-bander Beam	287.50	(10.00)
Jaybeam	TR2 Mx3 HF 2 element Tri-bander Beam	195.50	(10.00)
Jaybeam	TR1 Mx3 HF Tri-bander Rotary Dipole	97.75	(10.00)
Jaybeam	VR3 HF Vertical Tri-bander	66.70	(10.00)
(Full range of Jaybeam VHF and UHF Aerials available - please ring for details)			
10NNA			
10Nna	5 element 50MHz	37.90	(5.00)
10Nna	9 element fixed N. socket 144MHz	27.80	(5.00)
10Nna	2 x 9 element N. socket 144MHz	52.10	(5.00)
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10Nna	21 element 438MHz N. socket	40.15	(5.00)
10Nna	23 element 1250MHz	27.75	(3.00)
10Nna	23 element 1296/1269MHz	27.75	(3.00)
10Nna	55 element 19.196/1269MHz	44.75	(3.00)

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GRV	Wall size 51	14.75
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HB9CV	70cms	3.95
HB9CV	2 metre	8.95
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Duo	Centrepieces	2.00
Copper wire	50M 101s hard drawn	7.95
CX1400	Matchfield coaxial relay with control box (weatherproof)	39.95

BOOKS			
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Air Traffic Radio		2.00	(0.75)
VHF/UHF Airband Frequency List		3.95	(0.75)
The Complete guide to VHF/UHF frequencies 25-200MHz (NEW)		4.95	(0.75)
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SCANNERS (NEW Book)		7.95	(0.75)
Towards the RAE		4.25	(0.75)
Logbooks		3.50	(0.75)

### Alinco

ATM-2036	2m h/field c/w 30W amplifier	269.95
ALR-206E	2m 25W FM mobile	269.95

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108-136MHz; 144-174MHz; 76-108MHz; + LW/MW/SW

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150kHz-30MHz  
76-108MHz  
108-136MHz  
32 memories  
AM/SSB/FM BROADCAST

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EL80 80m whip	<b>£65.00</b>
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M287 7/8th 2m	<b>£25.95</b>
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Q130 Discone 2S-1300MHz	<b>£75.00</b>
RH200E 3db 2m BNC	<b>£28.50</b>
EL770 Dual band	<b>£26.50</b>

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ATC720 Airband rx	<b>£189.00</b>
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#### MISC.

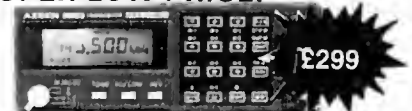
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60—950MHz

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# Communications Ltd.

RADIO COMMUNICATION December 1986



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We look forward to continuing to serve all radio amateurs in 1987 and welcome one and all to our new premises in the coming year.

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118-130, 130-140, 140-150MHz

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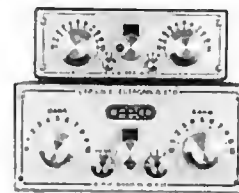
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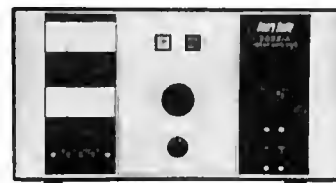
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## A SEASONAL MESSAGE FROM THE SOCIETY'S PRESIDENT

When I wrote my New Year's message a year ago I knew that the Society would face many challenges during 1986. Some of these were anticipated, others were not. I am happy to be able to report that through the combined efforts of both volunteers and headquarters staff the Society has been able to address each challenge as it appeared. As always it is the resources available to the Society which enable us to tackle the wide range of tasks that we face. Some tasks can be handled quickly, while the solution to some of the problems faced by amateur radio can only be solved in the longer term by sheer hard work.

One of the main challenges this year has been a further strengthening of the HQ management and a re-organization of HQ staff to meet today's needs. The changes made will enable the Society to operate efficiently into the mid-'nineties. In conjunction with this work, Council has also been looking at ways of improving the co-ordination of the priceless work done by our volunteers.

Considerable progress has been made in reviewing the

Society's Memorandum and Articles of Association. These had become less appropriate to the operation of the Society in today's environment. Some changes have been put forward by Council for consideration at this year's annual meeting. Much more needs to be done, though there is a practical limit to what can be achieved at each egm.

As this month's report from the secretary illustrates, the achievements of the Society in its dealings with the licensing authority have been very positive. However, the normally close working relationship has been strained on occasion, particularly when dealing with emc matters earlier this year.

The release of a new band at 50MHz, although only to Class A licensees for the moment, was a very satisfying culmination of many years of negotiation. This will hopefully give a new initiative to our sister societies in Europe, the USSR and Africa, which as yet do not have a 50MHz allocation.

During the year I have had first-hand experience of the high esteem in which the Society is held by other national societies. This is fortunate at a time when societies around the world must work closer together, through the IARU, to preserve and expand our frequency allocations. To this end, the Society has been preparing for the next Region 1 conference in 1987, at which frequency allocations for the amateur services will again be discussed.

To have been associated with the enthusiasm and hard work of many volunteers and HQ staff has made this year very stimulating and rewarding for me. I would like to take this opportunity to thank all those who provided such invaluable support through the year.

Together with my colleagues on Council may I wish you a very Merry Christmas and a Happy and Prosperous New Year.

Willie McClintock, G3VPC



The Christmas and New Year season of goodwill is a traditional period for both reflection and looking ahead. I hope that this month's front cover reflects that spirit. The Society has made some outstanding progress during 1986 and is set to achieve more during 1987.

Although the Society has not done everything it would have wished to in 1986, we can count the following among our positive achievements: a new amateur band at 50MHz, an enhanced *Call Book* incorporating a *Members' Handbook* section, the licensing of the first batch of experimental packet radio repeaters on 144MHz and the launching of a new monthly newsletter devoted to packet radio, the Class B morse facility which allowed Class B stations to practise their morse code over the air, the launching of the comprehensive RSGB dial-up DataBox information service on National Prestel (Page 8107) and the introduction of the RSGB Morse Test Service. Finally, work has started on further improvements to *Radio Communication* which I detailed last month.

Looking ahead, 1987 should be an exciting time for the Society. We want to improve the operation of amateur radio at local level; to achieve this we will need to work more closely with our representatives in the field and our affiliated clubs. We want to encourage more members to build equipment; to make this possible we intend to supply kits of parts to those wishing to build some of our *Radio Communication* projects. We expect to make *Radio Communication* look even better and make it more in-tune

with members' aspirations. As a longer term objective we want to do more to popularize amateur radio with young people—we will make a start during 1987.

On the DTI front, 1987 will be another busy year for the Society. More work needs to be done to ease the emc situation—an area which will involve considerable staff and volunteer effort. We expect to see soon some further licence changes to facilitate third-party messages sent from one licensed amateur to another, and unattended station operation. We hope, following a review by the DTI, that changes can be made to the licensing conditions for the new 50MHz band. Finally, there is to be a major review of the amateur licence during 1987. This review will look closely at all aspects of licensing and when complete will also have the advantage of allowing UK amateurs to benefit from the CEPT licensing arrangements. The licence review, a major undertaking both for the Society and the DTI, has been delayed because of other priorities. In view of this delay members are asked again to let me have their views in writing on proposed changes to licensing conditions. These will be looked at by the Society's Licensing Advisory Committee. Each and every member is free to contribute to this review. Our overall purpose is to deregulate amateur operation—one of the prime objectives of the Society.

Though the above has only touched on the vast amount of work undertaken by the Society on behalf of its members, it does illustrate some of our main priorities. It is the positive interaction of staff and volunteers which makes so much possible, but we could always do with more help. Perhaps one New Year's resolution could be to do something for the Society in 1987?

Finally, may I, on behalf of all the RSGB staff, extend to you best wishes for a happy Christmas and a prosperous New Year.

David Evans, G3OUF

# A TALKING FREQUENCY COUNTER

G N Fare, G30GQ\*

A FEW YEARS AGO, I carried out a survey among visually handicapped amateurs to discover what particular aid would be the most useful to them. Almost without exception, they said that the most useful accessory would be a talking frequency counter which would speak the frequency at which their receiver or transceiver was tuned.

There are now a number of transceivers on the market which have, as an optional extra, a talking frequency counter, but these obtain their information from the microprocessor incorporated in the equipment. They can therefore only be used with the equipment for which they are designed. There is a need for a talking frequency counter which can be used with any transceiver and which can be changed over when the equipment is replaced. Accordingly a suitable piece of equipment was designed and several are now giving good service in blind amateurs' shacks.

The equipment counts the frequency to which the transceiver is tuned but instead of a digital display, speaks the frequency in number sequence, operating on both transmit and receive, with an accuracy of plus or minus 1kHz. It can be switched to read the frequency continuously or "once round". In the continuous mode it can be used to give a continuous readout when tuning the band and in the 'once round' mode will speak the frequency once and then stop. An optional switch on the front panel selects MHz or kHz. This can be used in the MHz position to tell the operator which band he is on (a very necessary function in these days when the latest Japanese offerings do not possess a band switch) and then in the kHz position to speak the frequency within the band. The unit can be wired internally, by means of jumpers, to cope with transceivers whose vfo or synthesisers count down instead of up, with increasing frequency, and can cope with any i.f. offset. If the transceiver possesses a bandswitch, then there is no need to incorporate the megahertz readout, thus saving a few pounds, but even more important, reducing the number of controls. If you don't think that's important, try operating your transceiver with your eyes shut!

The counter preferably takes its power from the transceiver psu so that it automatically comes on, thus saving a control, although a mains derived psu can be incorporated if desired. Connection to the transceiver should present little difficulty provided one does not mind delving into the 'black box' and usually there is a spare way on one of the sockets on the back of the equipment which can be used to take off the necessary rf signal. Details are given later and I would be pleased to assist anyone who has a problem in this respect.

## Circuit

In order to make the counter as flexible as possible, so that it can be used with almost any transceiver, the counter portion uses ttl ics instead of lsi. This makes it a little more complicated, but also has the advantage that it is cheaper. The circuit can be divided into two separate parts. First, the counter, the circuit of which is shown in Fig 1, takes a signal from the vfo, local oscillator or synthesiser output in the transceiver and counts it with a conventional decade counter which is loaded with the i.f. frequency. The count is latched into a parallel bcd output for feeding the speech board. A 4MHz crystal oscillator is used which also supplies the clock frequency to

the speech processor chip (spe), thus serving a dual purpose. A front panel mounted switch decreases the divider by 100 thus moving the readout two digits to the right. This switch is used to enable the unit to output megahertz or kilohertz. To ensure flexibility, different connections are made when the unit is used with or without a prescaler.

The incoming signal, which should be at least 200mV p-p, is amplified and the output applied to a prescaler (IC8) which divides the frequency by 10 to bring it within the range of the ttl frequency limitation. This is necessary if the i.f. frequency is above 25MHz or so, which is the case with most modern transceivers, which have a first i.f. frequency of about 48MHz. It also enables the use of the counter up to 250MHz, which would include vhf transceivers. Above this frequency, an external prescaler should be used. The counter will work with signals as low as 100kHz.

The signal from the prescaler is gated with the clock pulse and fed to the three decade dividers (ICs 9 to 11). These dividers may be connected to count up or down by connecting the gated signal to the up or down pin, with the unused pin connected to 5V. This is useful if the vfo tunes downwards in frequency for an increase in frequency in the transceiver. In the majority of cases it will be connected to count up.

The dividers are loaded with the i.f. frequency and the loading is changed for megahertz and kilohertz. In the kHz position, the loading may be changed to compensate for the 3kHz difference frequency between upper and lower sideband. The bcd output from the counters is latched by IC12 to IC14 which provides a parallel bcd output to the speech board. The latch signal is also fed to the speech board for control purposes. IC15 functions as a four pole two way switch. When MHz is selected a bcd of 1111 is fed to the output instead of the data from the lsd latch (IC12). This produces a 32mS silence period so that only two digits will be spoken. If the unit is to be used with a vhf transceiver, this ic can be dispensed with, thus enabling three digits to be passed on, in which case, the clock frequency should be moved one connection (ie one less divided by ten), although, as it stands, the only digit which would be suppressed is 100MHz, which would probably not matter.

The choice of the source of rf signals from the transceiver depends on the equipment. As already mentioned, transceivers fitted with a bandswitch do not need to read megahertz and it is often quite feasible to count the vfo frequency only, but care should be exercised as all bands do not start at an integer of megahertz (for example, 80m starts at 3.500MHz). It is nevertheless possible to incorporate a bandswitch in the counter to load a different number when such bands are selected, but is an additional complication for a blind operator and is not really to be recommended, unless it is essential. It may, of course, be possible to obtain a control voltage from the transceiver, or at the risk of some complication, the required bands can be detected digitally and the correction made automatically. The best take off point is from the local oscillator feeding the first mixer. The counter is then loaded with the value of the first i.f. which will be added or subtracted from the local oscillator frequency to produce the same frequency reading as the incoming (or outgoing) signal. It is immaterial whether the local oscillator source is a crystal oscillator mixed with a vfo, or a synthesiser.

The speech board (Fig 2) takes its inputs from the bcd outputs of the counter board. These are multiplexed by IC16 and 17. Each of these ics

\* 1 Old Hall Close, Walton, Warrington



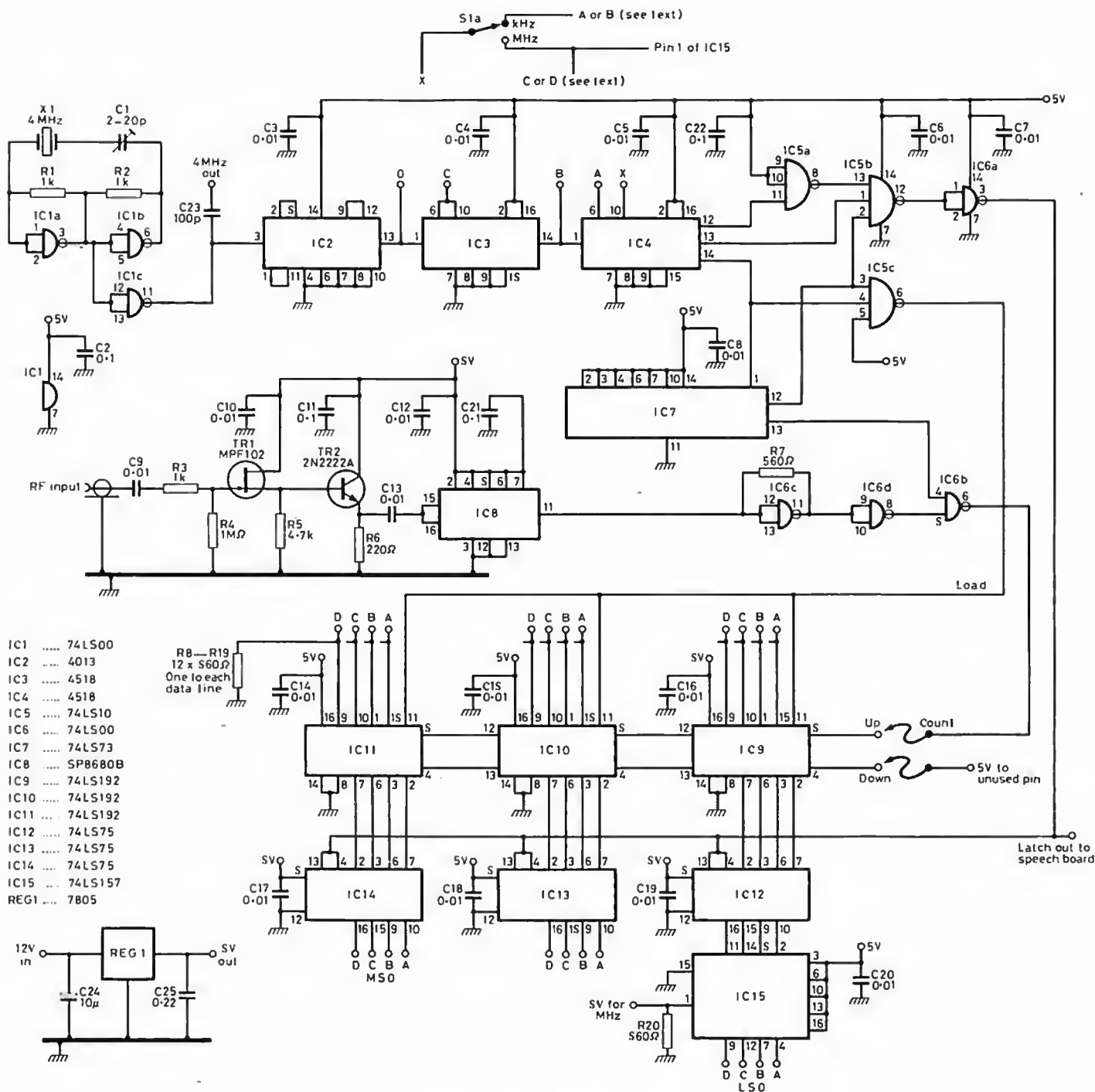


Fig 1. Counter board, circuit diagram

consists of two multiplexers which can select one of four inputs by using address lines A and B as the following truth table:

A	B	Q	
0	0	D3	(pins 6 and 10)
1	0	D2	(pins 5 and 11)
0	1	D1	(pins 4 and 12)
1	1	D0	(pins 3 and 13)

For example, if the address lines are 01, D1 will be selected from each of the four inputs (A,B,C and D). Depending on which inputs are high or low, a bcd output will be fed to the spc. If this happens to be 0000 then the spc will output the word "zero". Only three bcd inputs are fed from the counter board and a switch determines whether this will be kHz or MHz. The D3 position on the multiplexer chips are hard wired with 1111. This causes the spc to output a silence period between sentences, which is particularly useful in the continuous speaking mode. The multiplexer chips are

addressed by signals from a decade counter (IC18). This is loaded to reset at 0000.

The operation of the circuit is as follows. On switch-on, the wr line to the spc is brought high momentarily by C32 and R21. This causes the spc to latch the starting address into a register. On receipt of this command, the spc will output, in the form of speech, the data fed from the multiplexers. While the word is being spoken, the intr line from the spc will go low and TR1 will be switched off. On completion of the word, the intr line will go high and feed a pulse to the "up" pin of the counter (IC18). This will cause it to increment one and feed a different address to the multiplexers. The multiplexers will then select the next input data. When the counter reaches a count of 4, pin 6 (address line C) will go high. The inverter (IC19e) will then stop the first flip-flop (IC20) and the sentence will be complete.

When the "start" button is pressed, a logic 0 pulse is fed to the counter and this will reset the counter to start at 0. At the same time, the wr line will be pulsed and the process will recommence. The second flip-flop (IC20) is

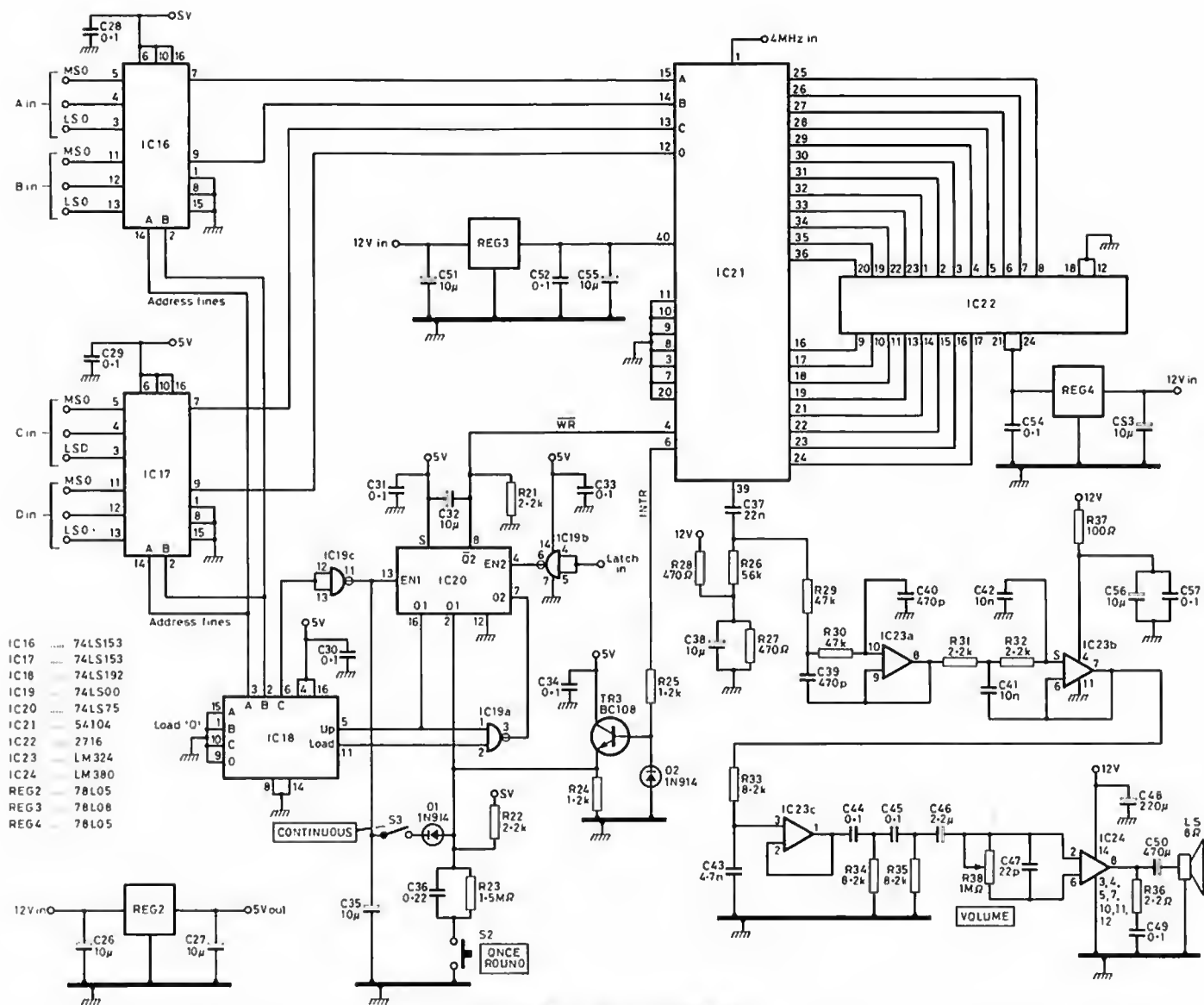


Fig 2. Speech board, circuit diagram

enabled by the latch line from the counter. This ensures that data is properly latched before being spoken. In the continuous count mode, a diode feeds the logic 0 to the load pin of the counter at the end of each sequence, thus reloading the counter and automatically repeating the whole process.

The spc takes its speech information from an eeprom which is addressed by the spc. Audio is taken from pin 39 and is filtered to remove the oscillator signals before being amplified. The spc is a 54104 made by National Semiconductor and is a Radiospares stock item (RS303-416). Radiospares also produce a rom but, unfortunately, in order for the spc to say "zero" it needs an address of 30 and each number needs one subtracting. This is an unnecessary complication and the RS rom is therefore not recommended.

The 54104 may also be obtained from DTV Group Limited, 2-12 Ernest Avenue, West Norwood, London SE27 0DJ at a price of £19.69 each + VAT. I will make a suitably-programmed eeprom available, on request, at a cost of £6.50 including postage. For those constructors who are able to program their own eeprom (2716) I will provide a program on receipt of an sae.

In order to output speech, the following requirements of the spc must be met. Pin 3 (chip select) must be low during a command. Binary data must be present at pins 8 to 15. We are only interested in four line data and therefore pins 8 to 11 are grounded. Pin 7 (command select) must be low to start speech sequence. Pin 4 (wr) latches the starting address from the eeprom into a register. When wr goes high the spc starts execution of the command set by pin 7. Pin 6 goes high at the completion of any speech sequence and is reset on power up or by the next valid command.

The vocabulary of the programmed eeprom is as follows:

Byte address	Message	Byte address	Message
SW8 0000	SW1 0000 Zero	SW8 0000	SW1 1000 Eight
0000 0001 One		0000 0001	1001 Nine
0000 0010 Two		0000 0010	0010 Point
0000 0011 Three		0000 0011	1011 20ms silence
0000 0100 Four		0000 0100	1100 40ms silence
0000 0101 Five		0000 0101	1101 80ms silence
0000 0110 Six		0000 0110	1110 160ms silence
0000 0111 Seven		0000 0111	1111 320 ms silence

## CONSTRUCTION

### General

The unit is constructed on two boards. Note that double sided board is used with the top copper used as a ground plane. Enlarge all holes on the ground plane side, except those needed for grounding, with a large drill bit. Components connected to ground are soldered directly to the ground plane. If using ic sockets, the pins to be grounded are bent at right angles and soldered to the ground plane.

### Crystal oscillator

This circuit (IC1 and associated components) supplies 4MHz to the clock divider and a clock signal to the spc, and should be constructed first. The track layout is given in Fig 3 and the components layout in Fig 4. After fitting the components, apply 5V to the board and monitor the output at the '4MHz out' pin with a frequency counter, or failing that, listen for the signal on a receiver. Adjust C1 for a frequency of exactly 4MHz. When the oscillator is operating satisfactorily, set the board aside.

## Speech synthesizer board

It is preferable to build this board next, as it can be used to check the operation of the counter board. This board is standard and does not vary with the type of transceiver with which it is to be used.

The track layout is given in Fig 5 and the components layout in Fig 6. Integrated circuit holders may be used if desired although it is worth bearing in mind that equipment used by blind amateurs is often subject to considerable physical abuse such as being inadvertently knocked off the operating table. It is therefore a good idea to glue down the ics if using holders. The LM380 must however have the grounded pins soldered to the ground plane without a socket. It goes without saying that everything else must be properly and securely mounted, and all wiring should be made with stranded wire.

When all components are fitted, fit the volume control, loudspeaker, and 12V to the appropriate pins and fit a length of miniature coaxial cable between the 4MHz oscillator previously constructed and the "4MHz in" pin. Connect all the bed input pins (12 altogether) and the "latch" pin to ground. Apply power and check that nothing seems to be overheating. With a screwdriver, ground the "talk once round" pin. The loudspeaker should say "zero zero zero". If it doesn't, first check the audio amplifier by putting a screwdriver on pin 2 of IC24 (LM380) and if a loud hum ensues, move the screwdriver to pin 10 of IC23 (LM324) when the same thing should happen. If not, the fault lies in the audio amplifier. If the audio amplifier is operating satisfactorily, check the supply voltages to all ics and make sure that any pin which should be grounded measures 0Ω to ground. Check pins 8 to 11 on the spe which should all be 0V. Pins 12 to 15 should be either 1 or 0 (that is, not floating). Check the voltage at pin 4 of the spe (wr). This should be 0V. On connecting the "talk once round" pin to ground, pin 6 should go low.

When all is operating satisfactorily, change the "A" connection to pin 3 of IC16 from 0V to 5V. Grounding the "talk once round" pin will then cause the unit to say "zero zero one". You can then amuse yourself by changing voltages on other pins and checking the operation up to "nine nine nine". Check the continuous talk by shorting the "auto" pins together. This should give a continuous talkout with a silence period between sentences, until the short is removed.

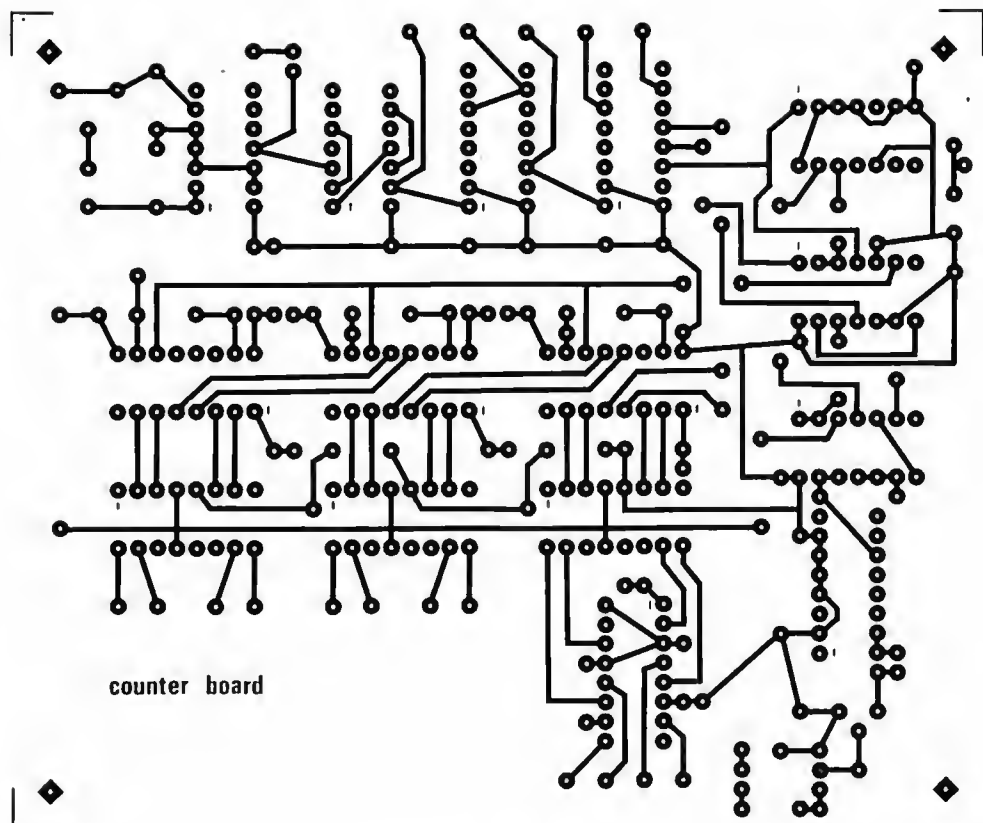


Fig 3. Counter board, track layout

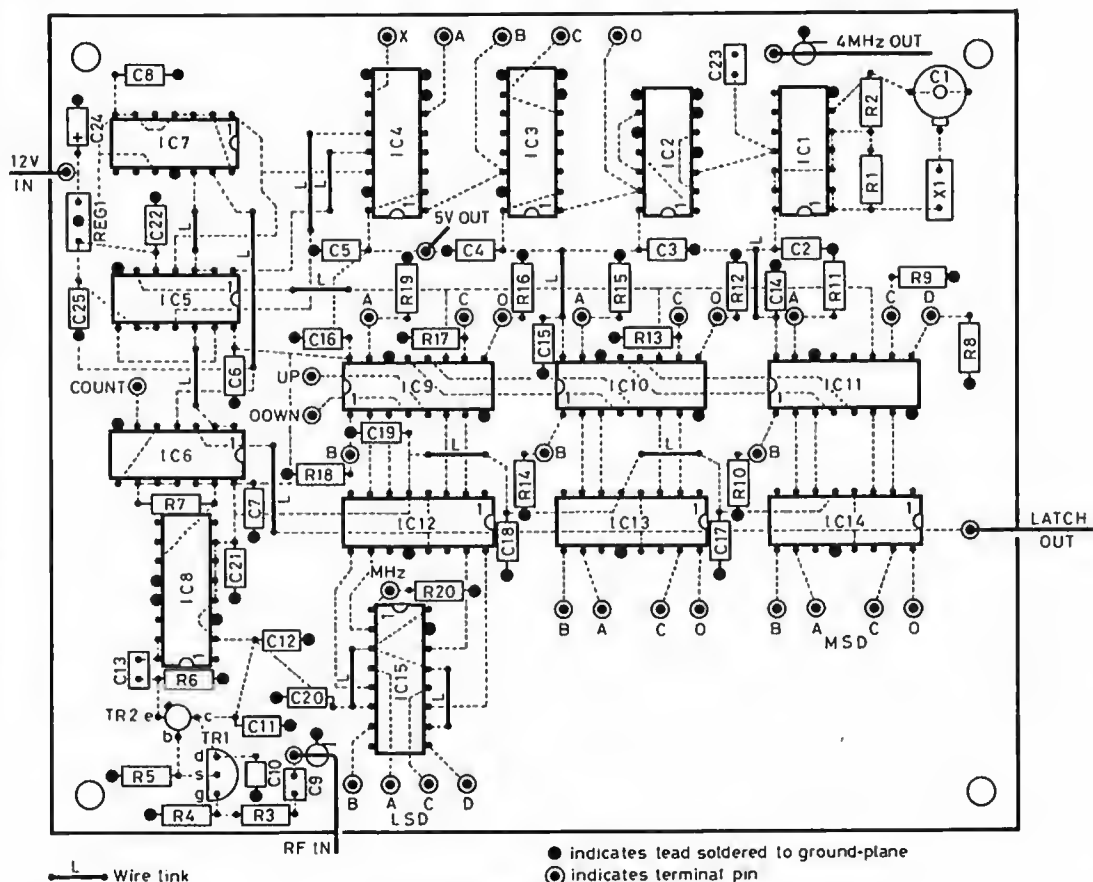


Fig 4. Counter board, components layout

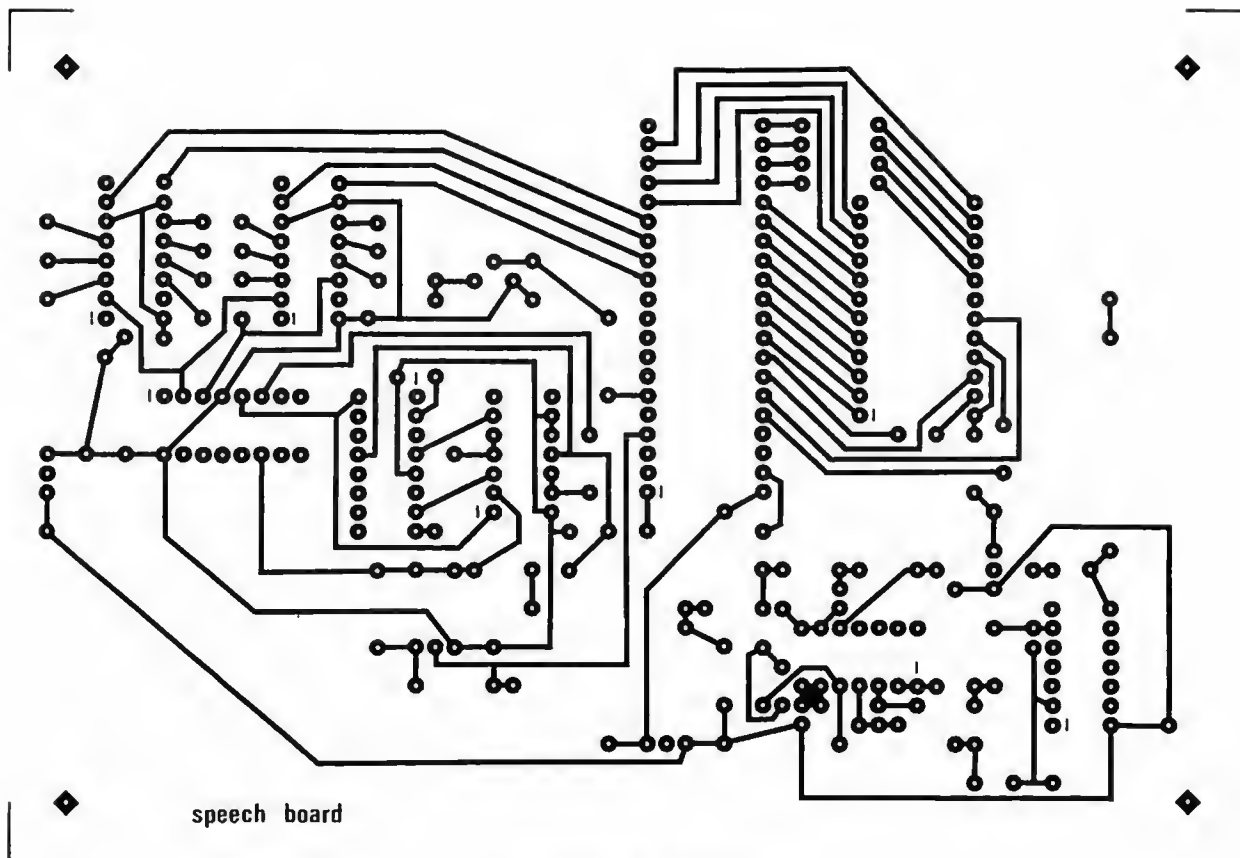


Fig 5. Speech board, track layout

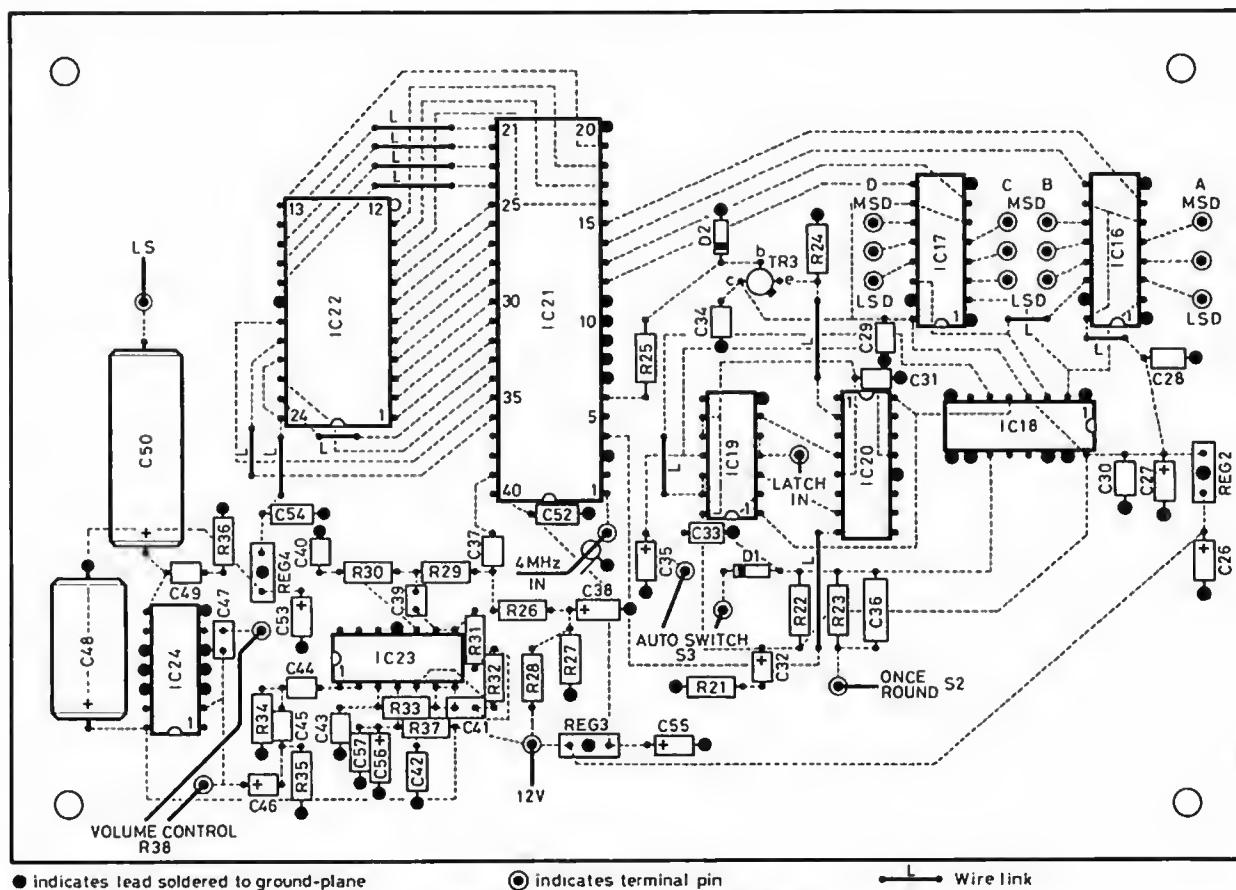


Fig 6. Speech board, components layout



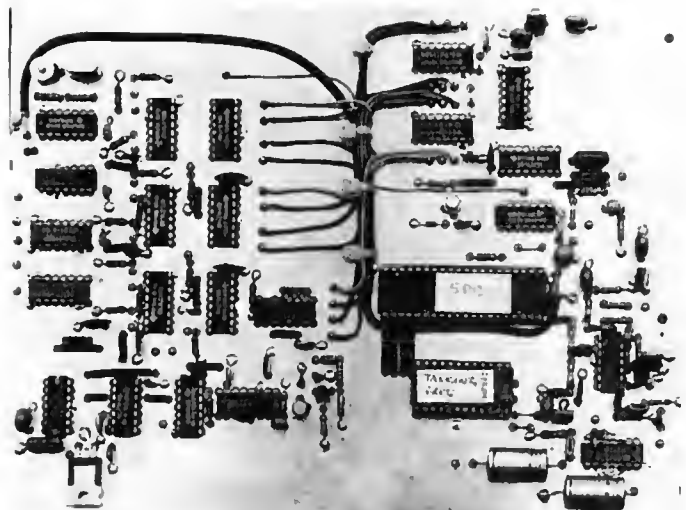


View of front panel. Note that switches toggle in different directions to ease identification. Lettering is for the constructors benefit and is not necessary. No USB/LSB switch is fitted in this example at the request of the operator

## Counter board

The remainder of the counter board should now be constructed. Here again, ic holders may be used if you must, except for IC8. The prescaler (IC8) may be omitted if the input frequency is below 25MHz, in which case, connect a wire link between pins 15 and 11 of the ic. The connections to the clock dividers should be wired to one pole of a double pole double throw switch. If no prescaler is used, the switch connects pin X to pin B in the kHz position and to pin D in the MHz position. If the prescaler is used, pin X is connected to pin A in the kHz position and to pin C in the MHz position. In the MHz position, the switch supplies 5V to the control pin of IC15. Wiring to the clock divider pins must be kept as short as possible. Bear this in mind when subsequently installing the board in the cabinet, so that the board is oriented to give the shortest possible leads. If you cannot position the board so that the leads are less than 3in long, it would be advisable to incorporate a relay to switch the clock.

On completion, connect a short wire from the "count" pin to the "up" pin and connect the "down" pin to 5V. Using ribbon cable connect the bed input pins on the speech board to the bed output pins of the counter board and a wire between the latch out and latch in pins. Connect a signal generator, or other rf source, to the "rf in" pin, and apply 12V to both boards. Ground the "talk once round" pin and the unit should speak the frequency. This should vary as the generator is retuned, and should read from the 100kHz digit down to the 1kHz digit. If this doesn't happen, check the clock first, following the frequency down the dividers up to the signal gate (IC6b pin 4). When this is satisfactory, check the signal at pin 5. This

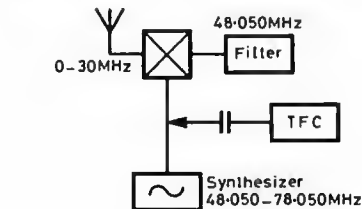


View of top of printed circuit board. In this example both boards are printed in one sheet which fitted easier into the box than two boards

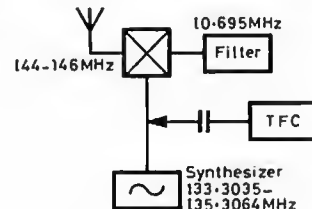
should be at the same frequency as the rf source divided by 10, and at ttl level. The signal may then be traced from pin 6 of IC6b to pin 5 of IC9 and pin 5 of succeeding dividers (ICs 10 and 11), divided by ten in each case. Check the latch and load signals with an oscilloscope if available or with a pair of headphones fitted with a series capacitor. The fault should be easily isolated.

## Cabinet

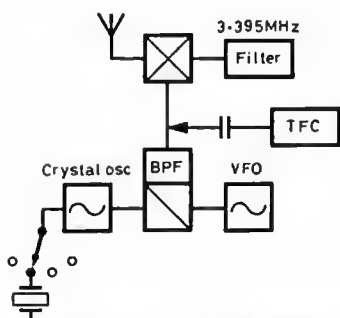
The unit is now ready for mounting in a suitable box. I used a heavy diecast box which is quite difficult to knock off the bench and something similar is recommended. The photograph shows the layout of the front panel. This particular panel does not incorporate the usb/lsw switch at the request of the operator. Points to note are, first, the box must be rf tight. Otherwise



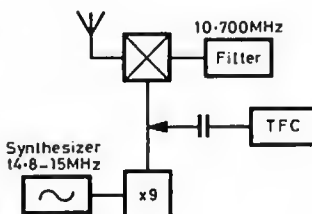
Typical modern transceiver with synthesizer and high first if. This is the simplest connection. Examples .... TR7 TS430S (48-005MHz if) R600, etc



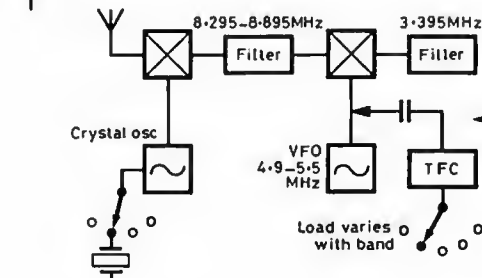
Typical vhf transceiver, single band, with synthesizer. Connection may need buffer amplifier. Example .... TR9130



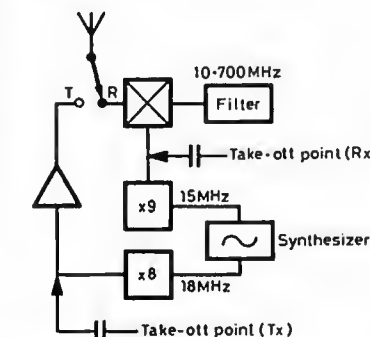
Typical transceiver using premixing of vfo and crystal oscillator. Fairly easy to make connection. Example .... SB104



Typical vhf transceiver, single band, with synthesizer and multiplier. Connection may be physically difficult and in practice, it may be easier to build an 'outboard' multiplier.



Typical transceiver with tunable first if. The easiest connection measures vfo frequency. Counter must count down and have different loadings for most bands. Prescaler is not necessary. Examples .... TS520 TS520S



Example of a very difficult take-off point. In this case the only practical method is to build 'outboard' multipliers. Not recommended.

Fig 7. Block diagrams of example connections

## COMPONENTS LIST

### RESISTORS 0-25W

R1, 2, 3	1k
R4	1M
R5	4k7
R6	220
R7 to R20	560
R21, 22, 31, 32	2k2
R23	1M5
R24, 25	1k2
R26	56k
R27, 28	470
R29, 30	47k
R33, 34, 35	8k2
R36	2-2
R37	100
R38	1M log

### DIODES

D1, D2 IN914  
Quantity IN914 as required  
for loading counters (see text)

### TRANSISTORS

TR1	MPF102
TR2	2N2222A
TR3	BC108

### VOLTAGE REGULATORS

REG 1	7805
REG 2, 4	78L05
REG 3	78L08

### SUNDRIES

Loudspeaker 8Ω  
Single-pole double-throw  
switch (see text)  
Double-pole double-throw  
switch (see text)  
BNC socket  
Momentary push-to-make  
switch

### CAPACITORS, CERAMIC PLATE

C3, 4, 5, 6, 7, 8, 9, 10,	
12, 13, 14, 15, 16, 17, 18,	
19, 20, 41, 42,	0-01μF
C2, 11, 21, 22, 28, 29,	
30, 31, 33, 34, 44, 45, 49,	
52, 54, 57	0-1μF
C23	100pF
C25, 36	0-22μF
C37	0-022μF
C39, 40	470pF
C43	0-0047μF
C47	22pF

### CAPACITORS, TANTALUM BEAD

C24, 28, 27, 32, 35, 38,	
51, 53, 55, 56	10μF 16V
C46	2-2μF 16V

### CAPACITORS, ELECTROLYTIC, AXIAL

C48	220μF 16V
C50	470μF 16V

### CAPACITOR, TRIMMER

C1	2/22pF
----	--------

### INTEGRATED CIRCUITS

IC1, 6, 19	74LS00
IC2	4013
IC3, 4	4518
IC5	74LS10
IC7	74LS73
IC8	SP8680B
	(RS 302-378)
IC9, 10, 11, 18	74LS192
IC12, 13, 14, 20	74LS75
IC15	74LS157
IC16, 17	74LS153
IC21	MM54104
	(RS 303-416)
	2716 (see text)
IC22	LM324
IC23	LM380
IC24	

on transmit, the logic will be interfered with, and on receive the counter may interfere with the receiver. This means decoupling the input voltage line from the psu by means of a feed through capacitor. Make sure the front and back panels make good dc contact with the rest of the box, so that the only way in which rf can get inside the box is via the coaxial cable. Second, all controls, ie knobs and switches, should be of a different shape so that a blind operator can identify each one by touch. The push button for the "once round" control is best fitted near the right-hand side so that it may be pushed by the thumb while resting the fingers on the side of the cabinet. Don't forget to avoid all sharp edges which can cause injury to fumbling fingers.

## Connection to transceiver

The rf input to the counter must be obtained from a source which changes frequency as the transceiver is tuned. This can usually be obtained from the input to the first receiver mixer. This can vary in complexity from extremely simple to comparatively difficult. Fig 7 shows simplified block diagrams of several different configurations with the take-off point shown. Paradoxically, the newest and most complicated transceivers are the easiest to connect to and the most difficult are those restricted to a single band, particularly single band vhf transceivers which multiply a crystal or synthesiser frequency before the input to the mixer. A study of the circuit diagram of your transceiver should show a suitable point, but if in doubt, I will be happy to advise on receipt of the circuit diagram of a particular transceiver. Some cases are particularly easy, for example, the Drake TR7 only needs a length of coaxial cable connected from pin 4/24 of the mother board to a spare phono socket on the back panel, a job which takes about 5min. The TS430S needs a connection from pin 1 of the pll unit (the vco output socket) to a spare way on the accessories socket on the rear panel, a job which takes very little longer.

Most transceivers have a spare way on a rear panel socket or a socket which is not used. For example, quite often there are phone patch sockets which are certainly redundant for their original purpose if the transceiver is used in the UK. The actual connection is made with a series capacitor which must be as small as possible. Start with 10pF and increase the size until the counter gives reliable readings on the highest frequency band. Having made the connection, tune in a weak signal and check that the signal is not affected by disconnecting the capacitor. If the signal is affected, it

probably means that the vfo or vco output is not powerful enough or the loading of the counter may be detuning the circuit, and a buffer amplifier with high input impedance should be inserted. This may be the same circuit as the input to the counter (ie TR1 and TR2 with associated components, with the coaxial cable connected to C13). This circuit may be built on a small piece of pcb, wired 'rats nest' fashion, if you do not want to make a small pcb, and power can be obtained from a convenient point in the transceiver. Make sure that voltage is present on both transmit and receive. All this sounds much more difficult than it actually is, and in nine cases out of 10 will be found to be extremely simple.

Once the rf and power connections are made, the counter should be loaded with the i.f. frequency. This is done by connecting diodes (IN914 etc) from the bed loading pins of the decade divider ics to 5V as appropriate. As each input has a pull down resistor, pins with logic 0 may be ignored. If the i.f. frequency is higher than the received frequency (ie up-conversion), the actual number loaded should be nine's complement of the required number. A 9's complement table is as follows:

Decimal	Binary	9's complement	Decimal
	DCBA	DCBA	
0	0000	1001	9
1	0001	1000	8
2	0010	0111	7
3	0011	0110	6
4	0100	0101	5
5	0101	0100	4
6	0110	0011	3
7	0111	0010	2
8	1000	0001	1
9	1001	0000	0

For example, the TS430S has a first i.f. of 48-005MHz. Therefore a signal at, say, 10MHz has a local oscillator input to the mixer of 58-005MHz. To obtain a readout on our counter of 10-000MHz, we must subtract 48-005MHz from the local oscillator signal. Looking at the 9's complement table, this means that, for the 1kHz digit, we must load 0100 (ie 5V on C and 0V on D, B and A) to the least significant digit. This will load the 9's complement of 5 (ie 4). The other two digits are loaded with 1001, being the 9's complement of 0. In the case where we need to add the i.f. to the lo, the number to be loaded is the same as the i.f.

It will be necessary to change the least significant digit if you wish to cater for upper and lower sideband, and this may be easily done with a front panel switch which changes the loading. However, most blind amateurs will be quite happy to be within 1-5kHz of the frequency, especially if, in the past, they have not even been absolutely sure which band they were on. If you do decide to fit an usb/lsb switch, it is best to load the least significant digit with the correct frequency for usb and switch to 3kHz less for lower sideband.

The MHz/KHz and USB/LSB switches should now be wired in place of the temporary wiring previously fitted. Loading inputs which are at logic 0 may be left as the pull-down resistors will load them correctly. It is therefore only necessary to load pins which should be at logic 1. This is carried out by means of diodes. Fig 8 shows an example of the switching used with a first i.f. of 48-005MHz giving a usb frequency of 48-0065 (loaded as 48-007) and a lsb frequency of 48-0035 (loaded as 48-004). In the interest of mechanical stability, the diodes should be fitted to a piece of Veroboard. 9's complement is used as the i.f. is deducted from the lo.

Continued on page 847

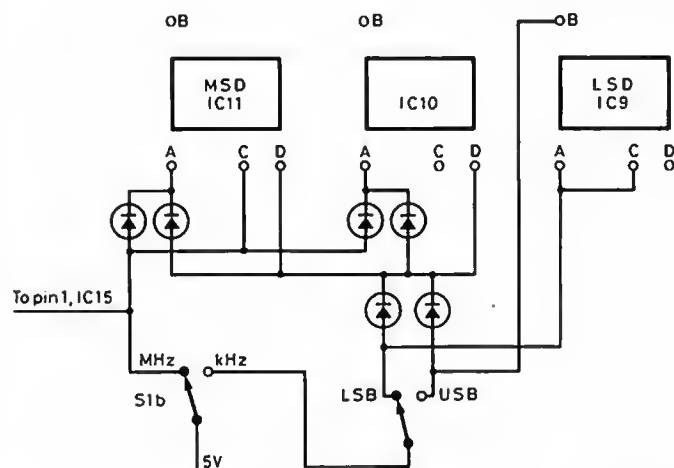


Fig 8. Example of loading connections

# A NECK BOOM MICROPHONE FOR MOBILE USE

by D Maciver, G1SJU\*

MOBILE OPERATION is one of the greatest boons of amateur radio. When driving to or from work on the motorway or around town one is able to call on help from other amateurs for directions or other assistance whenever needed. A long and often boring journey down a motorway can be made to seem quite short by an interesting QSO.

The one drawback to this is the problem of handling the microphone while still driving safely. The Department of Transport is planning to introduce a new Highway Code rule (rule 49a), which will place the radio amateur in a difficult legal position in the event of an accident occurring while using a handheld mic. The answer is provided by a hands-free microphone of the headset or neck type. These are available quite widely but are rather expensive at around £20 to £65 each. This article describes the construction of a simple but effective neck boom mic suitable for use with almost any make or model of mobile rig, provided it uses push-to-transmit type microphone switching. If built as shown the cost will be about £9.

## Circuit description

The microphone cartridge used is an electret condenser type chosen for its very small size. This gives a very high quality audio output, better in fact than most normal hand or base dynamic microphones. Electret condenser



The author seen here modelling the neck mic boom, was born in 1944 and has been interested in amateur radio and electronics since the late 'fifties. Encouraged by an amateur radio friend he finally took the RAE in December last year, and is at the present time studying morse at the Barking Amateur Radio Club. A director of a small electronics company involved in security work, his main interests are in computer programming linked with amateur radio (Ascii, data tx/rx, packet radio etc). He has also set up a user group for the Acorn Master series of computers involving mainly, but not exclusively, radio amateurs.

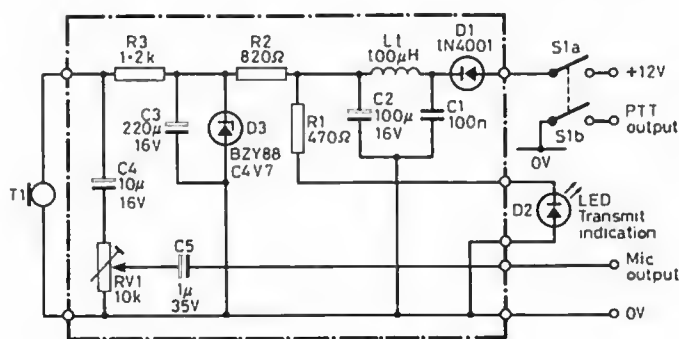
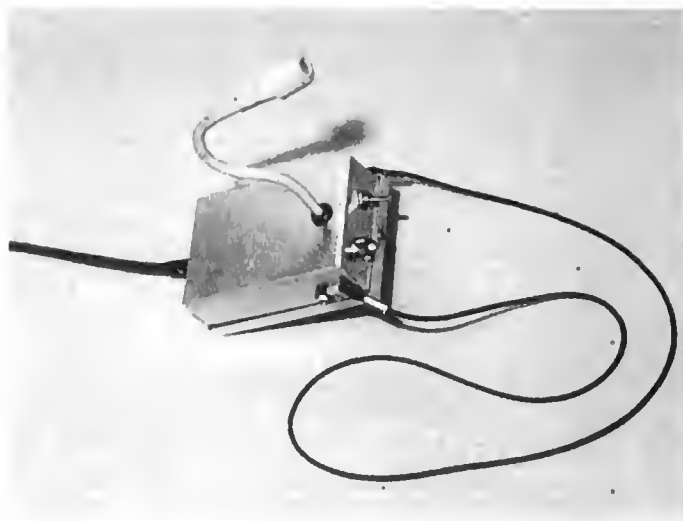


Fig 1. Circuit diagram

microphones have one of their plates charged at the time of manufacture so that a large polarizing voltage is not required. The output of these cartridges is very low and is amplified by a fet built into the electrets case. This amplifier needs a supply voltage of 1.5 to 3V, which may be obtained from the 12V vehicle supply either via a cigar lighter connection or from the mike socket on the transceiver.

The 12V supply is fed through the reverse polarity protection diode D1 (see Fig 1), the filter L1, C1, is then dropped to 4.7V by the circuit of R2, D3, C2. It is further dropped by R3 to approximately 2.5V before being fed to the electret. The output of the electret is fed through dc blocking capacitor C3 to the level control RV1. This signal is then fed to the transceiver via C4. The LED D2 is the transmit indicator.

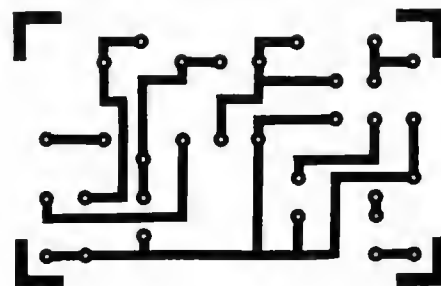


Fig 2. PCB track layout

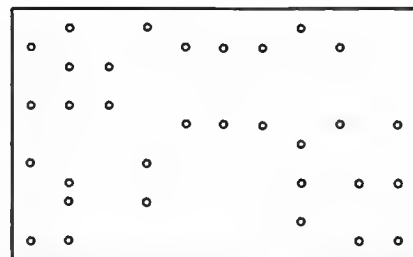


Fig 3. Drilling template (component side)

\* 176 Burges Road, London E6 2BS

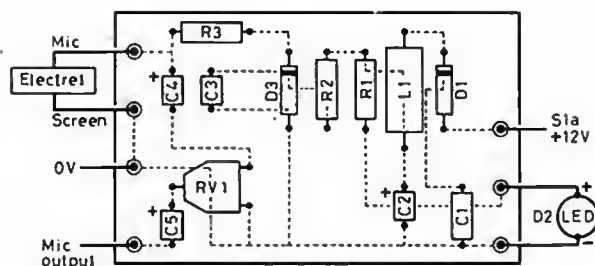


Fig 4. Component layout

## Construction

The circuit is built on a pcb measuring approximately 55 by 35mm (see Fig 2), but Veroboard may be used if preferred. Component positions are clearly shown in Fig 4. A similar layout will be found suitable for Veroboard construction.

First solder the resistors into place, followed by the capacitors, taking great care to observe the polarity of the capacitors. Next fit the choke coil L1 and finally the diodes D1 and D3 (again, making sure the polarity is correct).

Clip the wire ends of the l.e.d D2 about 5mm from the plastic body and solder a black wire to the side that has a flat on the body and a red wire to the other side. These wires should be about 450mm long. Insert these wires into the l.e.d position on the board (red to +) and solder in place.

## Boom assembly

Take 300mm of very thin screened cable, strip back 10mm of the outer covering. Solder the screen to the pad of the electret cartridge marked "0" or GROUND OF SCREEN, and the centre conductor to the pads marked + and OUTPUT.

**Warning:** it is essential to use a small soldering iron and work quickly when soldering the electret as it is easily destroyed by excessive heat.

Cut 170mm of the plastic tube and 220mm of 2.5mm-thick copper wire. Bend one end of the copper wire back on itself by 10mm. Slide the copper wire and the screened cable through the plastic tube. The assembly at this stage should look like Fig 5(a).

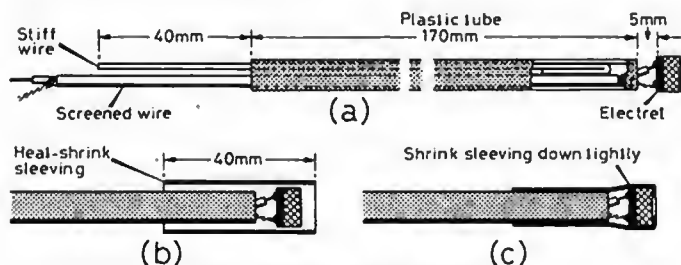


Fig 5. Mic boom construction

Next, take 40mm of heat-shrink sleeving and place this over the electret cartridge as shown in Fig 5(b). The sleeving should be of a size that just slips over the electret without effort. Without disturbing the assembly apply heat from a hot-air gun evenly to all parts of the heat-shrink sleeving.

Once the sleeving tightens onto the electret, concentrate the hot air around the end of the plastic tube. As soon as the sleeving is gripping the plastic tube neatly and evenly, remove the heat. It is important to use a hot air gun as the shrinkage must be accomplished quickly enough to avoid overheating the electret.

The completed boom assembly should look like Fig 5(c). If you make a mess of it the first time, simply cut away the heat-shrink tube carefully and do it again.

## The case

Drill the case as shown in Fig 6. The dimensions of the holes is left to the constructor but should suit the components and cable etc being used.

Cut four rings of the heat shrink sleeving each about 5mm wide. Feed the boom tube through the hole in the front of the case and then shrink each of the rings onto the end of the tube one on top of another. This is to prevent the tube being pulled out through the case. An alternative method would be to use a small plastic cable tie round the end of the tube.

Fit the switch in place and wind one turn of the thick copper wire from the tube around the threaded shaft of the switch inside the case before tightening the securing nut. Cut away the excess copper wire.

## Components list

R1	470 0.25W
R2	820 0.25W
R3	1k2 0.25W
RV1	10k 0.1W min horizontal preset
C1	100nF 40V disc ceramic
C5	1µF 35V tantalum bead
C4	10µF 16V tantalum bead
C2	100µF 16V miniature electrolytic
C3	220µF 16V miniature electrolytic
D1	1N4001
D2	Yellow l.e.d 5mm diameter
D3	BZY88C4V7 4.7V zener
L1	100µH 0.3W rf choke
T1	Electret mic insert (miniature type)
S1	DPDT sub-miniature toggle switch

Printed circuit board.

LED mounting bezel.

Plastic case, 70 by 45 by 25mm.

30cm of thin screened wire.

22cm of thick copper wire (stripped piece of 2.5mm will do).

17cm of small flexible plastic tube (approximately 4mm od).

3m of four-core screened cable.

1 short length of heat-shrink sleeving (slip fit over electret).

1 spectacle safety cord.

**Note:** A complete kit of all parts needed, including the printed circuit board, can be supplied by post, price £9.95 incl p&p from: Digital Security, 176 Burges Road, London E6 2BS.

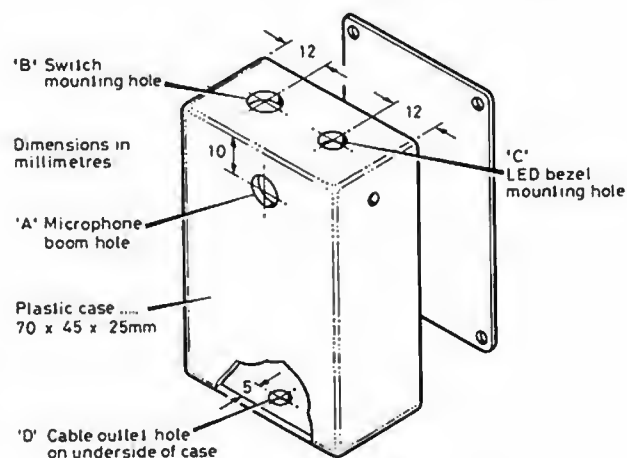


Fig 6. Case drilling diagram

## The cable

The cable should be long enough to reach from the rig to your seating position without getting tangled in the gearstick, steering wheel etc. About 3m should be adequate. The type of cable used on the prototype has four cores, one of which is screened. A suitable alternative is the four-core, individually screened type used for stereo tape-to-tape leads.

Pass the cable through the hole in the bottom of the case and wire up the switch, board and cable as shown in Fig 7.

Finally, fix the completed board inside the case. The actual method of fixing the board is left to the constructor. Double-sided tape, Buddies sticky pads or Bluc Tack could be used, but it is suggested that a small piece of foam rubber is cut to fill the remaining space in the case to prevent the board working free during use.

## The neck strap

The strap is a spectacle safety cord available from any optician. Two self-tapping screws must be fitted, one in each side of the case near the top.

These screws are left sticking out slightly and thus form the lugs for the strap. This has small rubber loops at each end which clip over the heads of the self-tapping screws.

An additional advantage of this type of strap is the case with which the strap can be clipped and unclipped.

## Connecting to the transceiver

The rig end of the cable will have to be wired up to suit the particular transceiver in use. Some makes have 12V available at the socket already, some do not. If yours is one of the types without this feature you have one of the following options.

The first and the simplest is to run a single wire from the unit to a cigar lighter plug to obtain the 12V + needed.



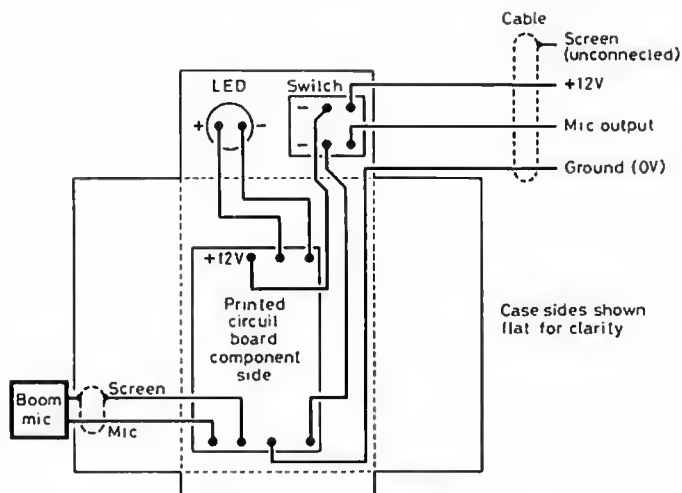


Fig. 7 Case wiring diagram

The second is more complicated and involves opening up your rig. This should not be attempted unless you have the knowledge and the skill to carry out the modification. Blowing up your rig may be a very expensive exercise.

Transceivers fitted with the four pin socket usually have two of the pins

inside grounded. The modification consists of removing the grounding from one of these pins and running a wire from the output side of the on/off switch (+) to the spare pin thus obtained. This will also entail some rewiring of the standard hand microphone. One of the pins that was connected to ground has the screen wire to the mic connected to it. This pin should remain connected to ground. The wire that was on the other grounded pin should be connected to the screen braid. If done correctly the four pins from the rig are now:

0V ground feed.....	One wire + screen
PTT.....	One wire
Microphone output.....	One screened wire
12V + supply.....	One wire

Make a note of which pins go where, and wire up the cable from the unit accordingly. The braid or braids should be joined with the 0V wire at the rig end of the cable, and the braid left unconnected at the mic end. The normal hand mic plug should also be rewired to ensure that the 12V supply is not connected to it.

Some rigs do not use switched 0V to operate the ptt relay but instead, sense the impedance of the mic when it is switched into circuit. If your rig is of this type then the modifications shown in Fig 7(a) should be used.

### Other uses

The neck boom microphone is so easy and cheap to build that it is well worth making another one with a longer cable for use in the shack. This gives freedom to move around the room while continuing your QSO uninterrupted. I have been using one with 5m of cable for several months with no problems whatsoever. □

## A TALKING FREQUENCY COUNTER

(Continued from page 844)

### Operation

Operation is extremely simple. If a psu has not been built in, the counter should obtain its power supply from the transceiver so that it automatically comes on at the same time. Set the MHz/KHz to MHz and the AUTO switch to ONCE ROUND. Press the START button and the counter will say "zero three" (or to whatever frequency in megahertz the transceiver is tuned) and then stop. Switching the AUTO switch on will cause the counter to say "zero three (silence) zero three (silence)" and so on until the AUTO switch is turned off. Switch to KHz and ONCE ROUND and press the START button. The counter will say "one two three" (or whatever frequency in kilohertz to which the transceiver is tuned) and then stop.

In the AUTO position, the counter will speak the frequency continuously and can be used for tuning a band. Some practice is needed here as the counter takes a finite time to speak the frequency, unlike a digital display which is almost instantaneous. The frequency should therefore be changed slowly and preferably in steps, waiting until the counter has spoken the frequency before moving on. The main problem arises at a change in the

100kHz digit. For example, tuning from 199kHz to 200kHz, the counter will say "one" when it is tuned to 199 and if the frequency is changed to 200kHz before the next digit is spoken, it will say "zero zero". The readout will then be "one zero zero" instead of "two zero zero". Of course, the next time round, it will say "two zero zero" (correctly). With a little experience of using the unit, this problem does not arise but it is advisable to point this out to the blind operator and to demonstrate how it can happen. An earlier model had a circuit which froze the count while speaking was taking place, so that the above effect did not occur, but operators then found it much more difficult to search the band, and it was therefore abandoned in favour of the present system.

Operation can be carried out on receive or transmit and operators have been known to take delight in transmitting the spoken frequency by holding the microphone near the loudspeaker, succumbing to "one-up-manship".

### Further developments

The speech board could, of course, be used with any unit which has a bcd output. For example, it would be a fairly simple matter to construct a swr meter with the output fed to an A to D converter. This would be quite a useful accessory. Other uses could certainly be found, limited only by the ingenuity of the constructor. If the speech board is used in this way, then a 4MHz crystal must be fitted, as shown on the data sheet.

### Conclusion

There is no doubt that a speaking frequency counter revolutionizes the operation of a blind amateur. Those lucky few who possess one of these units now say that operation is very much easier. □

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# A RAD COM IN-DEPTH KIT REVIEW

## THE MAPLIN TU1000 RTTY TERMINAL UNIT

Steve Price, G4BWE\*

RTTY OPERATION has certainly received a shot in the arm during the last few years with the arrival of inexpensive home computers and the development of Amior.

Many enthusiasts have entered the fascinating world of rtty by first assembling a "bargain basement" teletype set-up consisting of just an hf receiver and the ubiquitous Sinclair Spectrum. Audio from the receiver loudspeaker socket is coupled directly to the Spectrum's cassette interface (the socket labelled EAR) after which ingenious machine code software takes over; firstly enabling the EAR socket to function as an analogue port, and secondly separating the received mark and space tones using devious algorithms which provide a crude form of digital filtering. However, this technique, although capable of decoding strong rtty signals in the absence of QRM, leaves a lot to be desired.

The preferred method involves the use of an rtty demodulator, or terminal unit (tu) as it is more often known, which is interposed between the receiver and the computer. Its job is to filter the audio tones from the receiver and discriminate between the mark and space frequencies (1,445 and 1,275Hz respectively in amateur operation), thus producing an output consisting of just two logic levels (eg 1 = mark, 0 = space). Consequently, the computer is presented with a serial "bit stream" rather than the undemodulated tones, and so decoding the transmission is relatively straightforward and far less prone to errors.

Needless to say, the quality of the tu is paramount in determining the performance achieved, so before examining the Maplin TU1000 in detail it will be useful to take a look at an already well established design that many consider to be a reference standard in this area; the BARTG ST5.

Anyone who has studied the circuitry of the ST5 (not reproduced here) will probably have been surprised at its relative simplicity. The first stage comprises a very high gain audio amplifier which functions as a limiter and serves to remove any amplitude variations in the input. The limited signal is then presented simultaneously to two filters, which are merely parallel-tuned circuits utilizing 88mH toroidal inductors in conjunction with fixed capacitors. One tuned circuit is set to resonate at 1,275Hz (space) and the other at 1,445Hz (mark). The potential developed across each tuned circuit is then rectified and lowpass filtered ("smoothed"), producing two separate dc levels. Finally, these levels are combined and then fed to the input of an op-amp comparator ("slicer") which provides an output that toggles between high and low depending on which filter is generating the greatest voltage at any instant.



A simplified block diagram of the Maplin TU1000 is shown in Fig 1, and there are some fundamental similarities between this design and the ST5. The TU1000 also employs an input limiter which consists of a 40dB voltage amplifier that drives a pair of clipping diodes. The bulky fixed-tuned circuits of the ST5 are replaced by two switched capacitor active filters (F1 and F2), both of which are contained within a single ic package (an MF10C). The great advantage of using switched capacitor filters is that they can be tuned by the use of a variable-frequency clock oscillator. The filter's resonant frequency is equal to the clock frequency divided by 100. In the TU1000 one of the two filters is permanently driven by a clock oscillator preset to 127.5kHz which provides filtering of the space tone at 1,275Hz. In contrast, the clock oscillator driving the mark filter may be operated at any one of three pre-set frequencies (144.5, 170 and 212.5kHz) or, alternatively, tuned over the range 127.5 to 227.5kHz (approximately) using a front-panel potentiometer. These features are very useful because they enable the mark frequency to be set not only at 1,445Hz for 170Hz shift amateur transmissions, but also at 1,700 and 2,125Hz for optimum reception of commercial traffic utilizing either 425 or 850Hz shifts. Furthermore, the potentiometer adjustment enables the tu to cope with a wide variety of non-standard shifts.

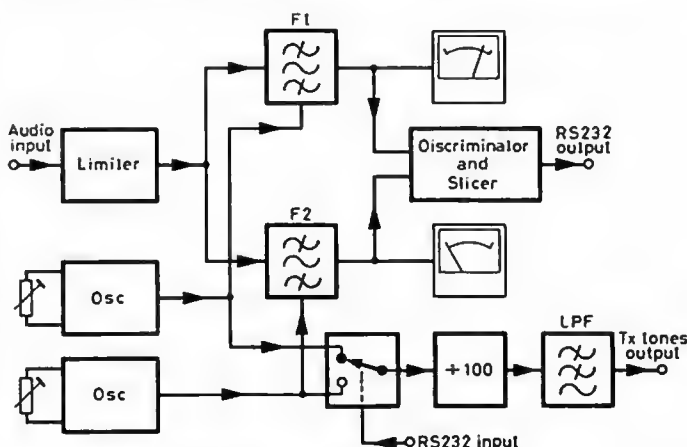


Fig 1. Simplified block diagram of the Maplin TU1000

\* 458 Soundwell Road, Kingswood, Bristol BS15 1JU.

The filter outputs drive a diode discriminator which has a function analogous to that of the ST5 output circuitry. Following the discriminator there is a fairly complex "bit slicer" arrangement which is designed to minimize erroneous responses and prevent the tu outputting gibberish in the absence of signals. Dual tuning meters monitor the average level at the output of each filter, and there is a facility to reverse the tone sense by a front-panel push button. The TU1000 output is RS232 compatible, ie logic levels 0 and 1 are represented by either +12 or -12V respectively, the output state being indicated by l.e.ds.

The TU1000 can also be used to generate the audio tones necessary for afsk transmission. This is achieved by dividing the filter control oscillator frequencies by 100 and then feeding the square-wave divider output through a lowpass filter.

Finally, there is an on-board mains psu which provides regulated supply rails of +12 and -12V for the internal circuitry.

## Putting it together

Apart from a small meter assembly, the whole of the TU1000 is constructed on a single, double-sided pcb measuring approximately 7.75 by 5in. The pcb is not through-plated, so one of the first tasks is to solder in place over 40 track pins which provide the necessary links between top and bottom. The board is screen printed to indicate component positions, and although the markings are reasonably clear it would have been nice to have a separate paper print as a means of cross-checking. The instructions (which are in the form of a magazine article reprint) feature photographs of the completed board, but these have been photo-copied and so some detail has inevitably been lost. In all there are 67 fixed resistors, five presets, 37 capacitors plus numerous sockets (including 11 for ics), switches, diodes and l.e.ds which must all be correctly soldered into place. Clearly, this is definitely not a kit for the beginner, or for that matter, the faint hearted!

The instructions are reasonably clear, but do omit some important details. For instance, there is a requirement to put together a four-gang push-button switch assembly that involves the correct positioning of latching bars, a leaf spring and mounting bracket etc. The single diagram and nine short lines of text that are supposed to explain this operation proved woefully inadequate, and it was necessary to complete the job by a process of trial and error.

The components supplied appear to be of good quality and there were very few problems encountered in either selecting or soldering these onto the pcb. Three small, ceramic capacitors did not have the right lead spacing and there were a number of Siemens polyester capacitors supplied, despite polycarbonate types being specified in the components list (this last point is of no real consequence, however). DIL sockets are provided for the ics, plus cable for flying leads, mounting hardware and a complete set of control knobs.

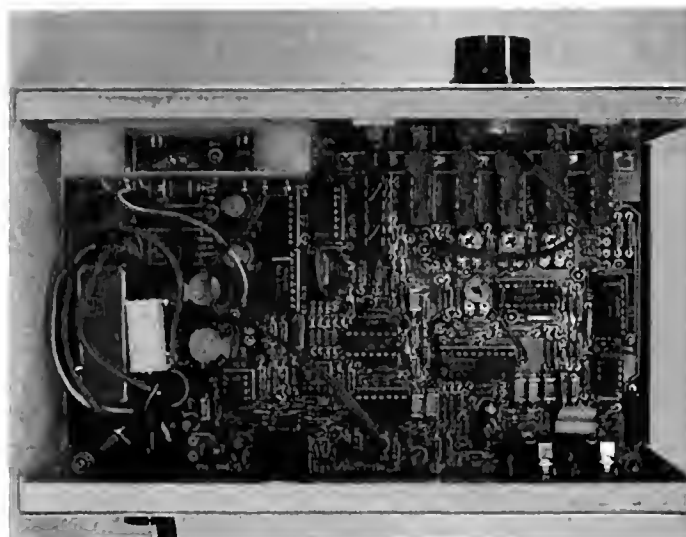
Having completed work on the main pcb and meter assembly, constructors will obviously wish to install the finished tu in a suitable case. Maplin are able to supply this item (order code XY45Y) but the case that arrives, although of precisely the right size, is completely undrilled. A considerable amount of metalwork is therefore required, involving the drilling and/or punching of large round holes for three DIN sockets, mains cable entry and fuseholder, plus the cutting of various rectangular apertures for the tuning meters, push button switches and indicator l.e.ds. Fortunately, the kit includes attractive front and back panels (self-adhesive) which can be used as templates for marking out the case.

There are comprehensive instructions to describe the final testing and setting-up procedure for the unit. A digital frequency meter is recommended for accurate calibration of the filter control oscillators, and many constructors will no doubt have to try and borrow such a beast! The TU1000 assembled for this review worked perfectly first time, although one of the functional tests outlined in the instructions gave slightly ambiguous results until an offending preset was tweaked.

## Performance and use

A five-pin DIN socket is employed for the RS232 IN/OUT and tone output connections. There are also two DIN loudspeaker type sockets for audio input (from rig ls output) and audio output (to external monitor loudspeaker). The first task to be undertaken, before the tu can be put into normal use, therefore, involves making up the necessary patch leads.

The choice of RS232, utilizing +12V and -12V logic levels, is rather unfortunate as it precludes direct connection of the TU1000 to any computer not provided with an RS232 port, and very few of the most popular home micros include this facility. Of course, cheaper computers such as the Sinclair Spectrum do not have i/o ports at all; however, many owners of these machines have built, or purchased, add-on i/o interfaces but these tend to be of the type that will only accept TTL levels (0 and +5V). It seems a shame that the Maplin tu is restricted to RS232; surely it would



be a simple matter to provide an optional TTL input and output as part of the standard design?

There is a great deal of suitable RTTY software available—much of it blatantly pirated—and the TU1000 instructions include a program listing for the Atari. However, this is really only of interest to the small percentage of humanity who possess an Atari micro.

The review tu was evaluated on receive using a Yaesu FT757 hf transceiver and a BBC Model B microcomputer. One of the BBC's parallel i/o ports was employed and this involved the addition of a simple logic level converter (RS232 to TTL) which utilized a single "open collector" switching transistor (see comments above). On 14MHz a number of very weak, noisy signals were copied almost 100 per cent—even in the presence of the "woodpecker". This is a creditable performance and certainly comparable with that of the ST5. The input limiter works very well, enabling the rig's af gain control to be reduced almost to minimum (although in normal operation a much higher setting is, of course, desirable). The circuitry intended to inhibit the output of gibberish in the absence of signals appeared to function correctly, and the tuning meters provided a delightfully positive and unambiguous response.

The TU1000 also proved very effective when switched to 425Hz shift and, as expected, gave more reliable performance than that which would have been obtained using a "fixed-tuned" tu designed for 170Hz shift only.

Extensive transmit testing was considered unnecessary as there should be no problems encountered here, either in normal RTTY or Amtor operation. However, the tone output was analysed using an oscilloscope, and this revealed a significant harmonic content. Only a rudimentary lowpass output filter is incorporated, but because this is driven with a square-wave input, even harmonics (eg the second harmonic of the space tone at 2,550Hz) are adequately attenuated. The same cannot be said of odd harmonics, and the one which could cause most problems is the third harmonic of the space tone (3,825Hz). Nevertheless, it can be expected that the i.f filter of a typical ssb transceiver will provide an additional attenuation of around 50dB at this frequency.

## Conclusion

The finished TU1000 is a very nice piece of equipment and not excessively expensive when one considers the facilities and performance that this well-designed unit offers.

A useful "Constructors Guide" supplied with the kit gives details of a repair service operated by Maplin for kit builders who have difficulty in getting their projects to work. Incidentally, Maplin make the point that a staggering 80 per cent of all kits returned to them are faulty simply because of poor soldering!

On the debit side, it seems a pity that only RS232 is catered for and that the owners of the most popular micros are given absolutely no information about suitable interfaces and methods of connection. Oh, and finally, please can Maplin produce an exploded diagram of that push-button switch assembly?

## Acknowledgements

Thanks to Maplin Electronics for supplying the review kit, and G4FRO for help with the operational tests. □

# HF EQUIPMENT SWITCHING UNITS

Louis Varney, G5RV, CEng, MIEE, AIL\*

MANY AMATEURS nowadays possess a spare transceiver which is kept ready for use after tuning up (preferably using a 50Ω dummy load) and transferring either, or both, key and microphone from the main equipment to the spare and then connecting to a suitable antenna. In many cases it is not possible, or desired, to provide a second antenna for such spare equipment and, especially with all-solidstate transceivers, damage may be caused by attempting to tune-up or use the spare set with no antenna connected; a condition which could arise when changing hurriedly from main to spare equipment.

In order to eliminate this risk and to facilitate a rapid changeover from main to spare equipment, a simple but very effective and convenient unit has been built and tested and is described below. Fig 1 shows the circuit with the option (shown inside the dashed line box) of an additional section which permits a third transceiver to be used if required. If facilities for the main and only one spare equipment are desired, the switch sections S1a, S1b and S1d only are required, and need only provide three positions with a mechanical stop at the third position. It will be seen that whichever equipment is on "stand-by" is automatically connected to an appropriate dummy load. The red LEDs, operated by S1d, indicate which of the transceivers is connected to the antenna.

If a multiband antenna (eg trap dipole) is used, the spare equipment can be switched to the antenna and operated immediately when needed even if it has been tuned up for use on another band, since no astu is required. However, even when an astu is used with a multiband antenna, it is a considerable advantage to have the spare set (or sets) tuned up on DL and ready for immediate use once the astu has been returned to the required band and frequency. If a calibration chart for the astu is used, this operation may

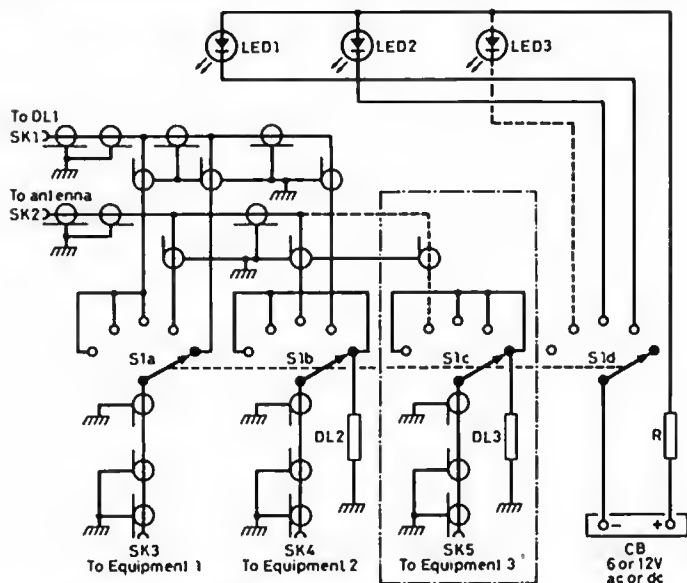


Fig 1. Circuit of equipment switching unit for two or three transceivers.

Switch shown in position 1, viewed from rear

List of circuit components

S1a, S1b, S1c, S1d	Four-wafer (ceramic) five-position switch with mechanical stop at fifth position
DL1	50Ω dummy load, 100W (minimum) rating, external
DL2	50Ω dummy load, 25W rating, internal
DL3	50Ω dummy load, 25W rating, internal
SK1-5	Coaxial sockets
LED1-3	LED (red)
R	1kΩ approx: 0.5 W for 12V supply, 470Ω for 6V supply
CB	Two-way connector block

be completed in a few seconds. Alternatively, an auxiliary antenna selector switch may be connected to SK2 if a number of antennas is available. When tuning-up or operating any particular equipment, the remaining equipment, or equipments, should be on a *different* frequency band (when possible, a *lower* frequency band) to that in use on the "active" equipment to prevent overloading the front-ends of these equipments on stand-by.

## Two-band instant QSY unit

Apart from protecting the spare equipment from accidental use with no antenna or dummy load connected, if a suitable second antenna is available a modified circuit (Fig 2) enables the second set to be tuned up and adjusted ready for immediate use on another band to that which is in use on the main equipment. A mere flick of the selector switch then permits a watch to be kept on a second band with, if desired, a quick "pounce" on that band if a rare dx station is heard. For both of the switching arrangements described, it is assumed that each equipment has its own microphone and/or keying unit.

## Construction

The desired unit may be constructed using any metal box of suitable dimensions to accommodate the ceramic wafer switch and associated components, coaxial sockets and the internal dummy loads with reasonable air space around them for heat dissipation. With normal short period tune-up procedure, these DLs should never become more than warm to the touch. Switch inter-wafer connections should be made with 16swg copper wire. Connections between the coaxial cable sockets (mounted in a row along one of the sides of the metal box) and the various switch wafers should be made using the shortest possible lengths of UR58/U coaxial cable. The outer braid of each of these short lengths of coaxial cable is connected to its associated coaxial socket outer conductor, but this braid is left "floating" at the switch wafer.

The internal DLs may be carbon rods or tubes of 20 to 25W rating, or can be assembled in the form of a suitable "bunch" or ring of 1 or 3W rating carbon resistors connected in parallel to give a resistance of 50Ω as they are only required for "tune-up" on reduced power for a minute or two. The external 50ΩDL should have a power dissipation rating sufficient to permit prolonged testing on low power or brief testing on full power of any of the transceivers. This resistor should, preferably, be a carbon tube of 25W rating in air, but can also be made up by using a similar bunch of

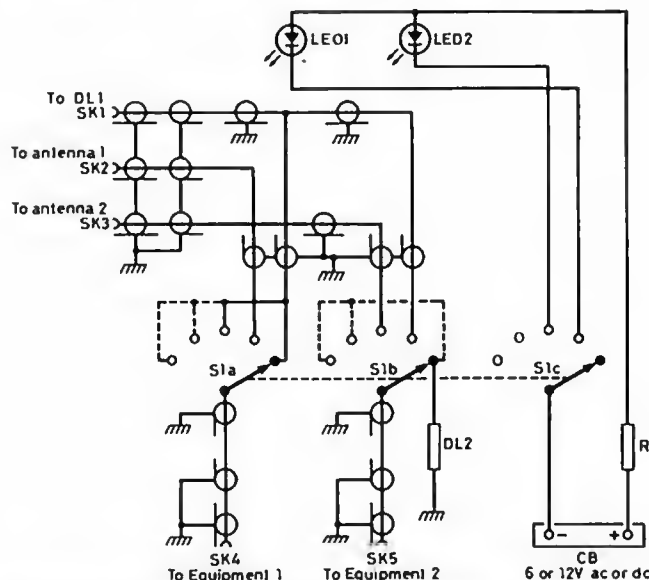


Fig 2. Circuit of two-band instant QSY unit for two transceivers (See note\* on Table 1). Three-position switch only required. If the switch available has more positions, the remaining positions on S1a and S1b should be wired as shown so as to avoid the risk of either equipment being operated when not connected to an appropriate antenna or DL. (Switch shown in position 1 viewed from rear)

List of circuit components

S1a, S1b, S1c	Three-wafer (ceramic) three-position switch with mechanical stop at third position
DL1	50Ω dummy load, 100W (minimum) rating, external
DL2	50Ω dummy load, 25W rating, internal
SK1-5	Coaxial sockets
LED1, 2	LED (red)
R	1kΩ approx for 12V supply, 470Ω for 6V supply; both 0.5W
CB	Two-way connector block

\*82 Folders Lane, Burgess Hill, W Sussex RH15 0DX.



Table 1. Switching functions\*

Switch posn	Equipmt No	Function
1	1	Tune/stand-by. Via SK3/S1a to external DL1
	2	Tune/stand-by. Via SK4/S1b to internal DL2
	3	Tune/stand-by. Via SK5/S1c to internal DL3
2	1	Operate. Via S1a/SK2 to antenna (direct or via astu)
	2	Tune/stand-by. Via S1b to external DL1
	3	Tune/stand-by. Via S1c to internal DL3
3	1	Tune/stand-by. Via S1a to external DL1
	2	Operate. Via S1b to SK2 (antenna)
	3	Tune/stand-by. Via S1c to internal DL3
4	1	Tune/stand-by. Via S1a to external DL1
	2	Tune/stand-by. Via S1b to internal DL2
	3	Operate. Via S1c to SK2 (antenna)
5	1	All connected to respective DLs
	2	
	3	

\*For the three-transceiver system. For a two-equipment system, only switch positions 1 to 3 apply. In the latter case, if no mechanical stop at switch position 3 is possible, all equipments must be connected to their respective DLs in switch positions 4 and 5.

carbon resistors of appropriate value, as described above, connected in parallel and mounted directly on the coaxial socket which, in turn, is mounted on the metal screw-top of a glass jar or pickle jar which is used to contain the DL.

The jar should be filled to the level of the top of the DL resistor with thin machine oil. Transformer oil is ideal if it can be obtained. A small diameter

Table 2. Measurement of vswr produced by the hf equipment switching unit

Frequency band (MHz)*	VSWR direct to DL	VSWR via switching unit to DL	Difference in vswr due to switching unit
1-8	1:1	1:1	0
3-5	1:1	1:1	0
7	1:1	1:1	0
10	1:1	1:1	0
14	1:1	1:1	0
18	1:1	1:1:1	+0.1
21	1:1	1:15:1	+0.15
24	1:05:1	1:2:1	+0.15
28	1:1:1	1:15:1	+0.05

\*Measurement made at centre frequency of each band

"breather" hole should be drilled in the metal screw-top. If desired, a suitable thermometer can be inserted in this hole in order to monitor the oil temperature. The DL container should never be allowed to exceed a temperature which is just warm to the touch. Immersing a DL resistor in oil increases its permissible dissipation by about seven times its rating in air. Thus, a DL made up of 20 x 1kΩ 1W carbon resistors connected in parallel and mounted in a bunch or ring and immersed in oil will have a value of 50Ω capable of dissipating 140W continuously.

A unit employing the circuit shown in Fig 1 and equipped for three transceivers has been in constant use at G5RV for several years and has proved to be a great convenience in station operating. □

## Report of the City and Guilds of London Institute on the May 1986 RAE

(Reproduced by authority of the Institute)

### STATISTICS

#### OVERALL RESULTS

Examination	No of candidates completing exam	Candidates qualifying for RAE certificates	No	%
Dec 1984	2,559	1,658		64.8
March 1985	140	94		67.1
May 1985	4,460	2,987		67.0
Dec 1985	1,980	1,364		68.8
May 1986	3,611	2,374		65.7

#### COMPONENT RESULTS FOR THE MAY 1986 EXAMINATION

Paper	Name of Component	No of candidates	Distinction %	Credit %	Pass %	Fail %
01	Licensing conditions and transmitter interference	3,349	8.2	26.9	38.1	26.8
			73.2%			
02	Operating procedures, practices and theory	3,443	10.7	26.0	39.9	23.5
			76.5%			

### REPORTS ON MULTIPLE-CHOICE QUESTION PAPERS

#### PAPER 765-1-01

Syllabus topic or objective	% of items	Comments on performance of candidates
Licensing conditions	57	The questions on licensing conditions were quite well answered by most candidates. There was some misunderstanding about the meaning of primary, and which bands are allocated to the amateur service on a primary basis. The types of recordings which may be transmitted from an amateur station were not fully understood by all candidates. Only half of the candidates knew that /P was the correct call sign suffix to use when operating from a temporary location. Over a third of the candidates thought that /T was the suffix to use. Over two-thirds of the candidates did not know what essential entries are required in a log book for a mobile station.
Transmitter interference	43	Some candidates had difficulty in understanding which capacitors in an audio pre-amplifier have the effect of attenuating the higher audio frequencies. The question about the factors affecting the frequency stability of a transmitter was not well answered. Over half the candidates thought that second channel interference was caused by a defect in the transmitter rather than in the receiver. The question on the rf key click filter circuit was

#### General comments

only correctly answered by a quarter of the candidates. Many candidates thought that the circuit was provided to eliminate chirp instead of short range interference from key clicks. Again this year, questions on the cause and cure of mains borne interference were badly answered. Most candidates did not know what type of filter to use to suppress mains borne interference. Almost half the candidates chose the circuit which is normally used for smoothing the output from a power supply.

In general, Paper 01 was well attempted by most candidates. 73.2% of the candidates who took the paper were successful.

#### PAPER 765-1-02

Operating procedures	18	Very well answered by nearly all candidates.
Electrical theory	11	Quite well answered by most candidates.
Solid state devices	13	Candidates had particular difficulty with three questions in this section. Only 18% of all candidates gave the correct answer to a question on the peak inverse voltage across a rectifier. Candidates did not realise that a feature of a push-pull rf amplifier is its inability to generate even harmonics. There was some confusion about the difference between a decoupling and a blocking capacitor.
Receivers	14.5	A disappointing number of candidates did not know the principal advantage of using a low intermediate frequency in a receiver. Also, most candidates gave incorrect answers to a question on the calculation of the second channel interference frequency.
Transmitters	14.5	The less able candidates did not understand how to compensate for the effect of increased temperature on frequency change in an oscillator. Nearly all candidates had difficulty with a question on keying a driver stage of a transmitter. Both questions on the application of frequency modulation to a transmitter were poorly answered.
Propagation and aerials	14.5	Most questions in this section were well answered but some candidates did not fully understand the reasons for fading.
Measurements	14.5	Quite well answered by most candidates. It was disappointing that not more candidates knew the purpose of a dip oscillator.
General comments		The paper was generally well attempted by most candidates and 76.5% of those taking paper 02 were successful.

Persons offering themselves for the Radio Amateurs' Examination continue to be reasonably well prepared. The above comments are provided for tutors and future candidates in an attempt to assist in their preparation for the examination. The need to support the theory and lecture room work with practical examples cannot be over emphasized.

# Technical Topics

by Pat Hawker, G3VA

IT HAS LONG BEEN a requirement of the ITU's Radio Regulations (which have the status of a formal international treaty) that all transmitting stations should radiate only as much power as is necessary to ensure a satisfactory service; that transmissions should be such as to cause minimum interference and ensure efficient spectrum utilization; and that there should be no unnecessary transmissions or transmissions without identification.

One has to admit that the good intentions of the Radio Regulations are not always adhered to in practice—neither by amateur nor professional users of the crowded radio spectrum. In mitigation, it could be suggested that deciding what constitutes "a satisfactory service" is a bit like debating how many angels can be accommodated on the head of a pin. Coverage of broadcast transmitters on mf, vhf and uhf is now as often interference-limited as signal-strength limited. Whereas hf broadcast transmitters in the 'thirties were usually rated at about 10 to 15kW output, today they commonly exhale 250, 500 or more kW into large antenna arrays that result in effective radiated powers well up into the megawatt region.

Such powers are not to overcome the problems of hf propagation but primarily to drown out co-channel interference from other broadcast stations or to overcome the major problem of man-made jamming (itself a breach of the Radio Regulations when the effects impinge on areas beyond your own frontiers). On hf no feasible power could overcome the basic limitations imposed by the ever-changing muf, the absorption in the day-time D-layer etc, and guarantee a sufficient fade-margin to overcome the distortion produced by selective-fading of double-sideband am signals.

The highly-competitive nature of so much present-day amateur radio operation has encouraged many UK amateurs to run up to, and sometimes well beyond, the legal power limits. It is little use pointing out that if everyone in Europe were limited to a maximum of, say, 50W rf output and relatively modest antenna arrays, there would be remarkably little difference, except perhaps on eme, in overall results. The trouble with 50W or less to a dipole or monopole is that your signals lose out to the high-power crowd unless you can operate at times when they are too busy earning the shekels needed to put a TH6 up to 100-ft, or you are content (as many of us become) to seek out the stations bearing less exotic call-signs.

## The dead zone boundary

Recently, to check further on the activity, or lack of it, on the 10.1MHz band (much increased since the appearance of Soviet amateurs) and also for my own enjoyment, I have been running about 15 to 20W rf output from the 5B/254M (miniature 807) power amplifier of a paramilitary Mk 123 transmitter-receiver and home-built vfo to what is virtually a random length of wire, about 37m long, fed through a pi-network atu.

This unambitious set-up provides satisfactory signals in the first-hop area beyond the "dead zone" only about one or two S-points below what could be expected from the usual 100W black box with resonant dipole.

Operating in this way has brought home to me not only the large skip or dead zone on this band at the present period of sunspot minimum (seldom under about 5–600 miles radius) but also the considerable depth of fading on signals arriving from close to the edge of the zone: much deeper and more pronounced than on the long-distance signals that come in when conditions are favourable. Signals from Japan, Australia etc seem to remain remarkably consistent for long periods whereas those from under about 700 miles can be S9-plus one minute and down to S2-3 the next.

In *IEEE Transactions on Antennas and Propagation* (September 1986, pp 1163–1170) a well-known American expert on radio propagation, Charles M Rush, provides a "mini-review" of ionospheric radio propagation models and predictions. This includes a clear description of the basic structure of the ionosphere that forms the basis of the "models" used to predict hf propagation. But it also includes a diagram that helps to explain why signals near the boundary of the hf dead zone can vary so much in signal strength and why the nearer signals are often much weaker than those a few hundred miles further away.

Many of the simplified diagrams on hf propagation still found in amateur radio handbooks not only ignore the existence of chordal hop modes but also seem to indicate that signals immediately beyond the dead zone arrive at full strength. In practice this can be misleading. What happens is that the edge of the skip is far from being sharply defined but is represented by a

quite large area of gradually increasing field strength. This means that incoming signals can increase from zero to S9 or S9-plus as they come from transmitters increasingly far away—and can fade away with any change in the skip. There can be a large coverage area of strong signals before reaching another area of declining signals with increasing distance.

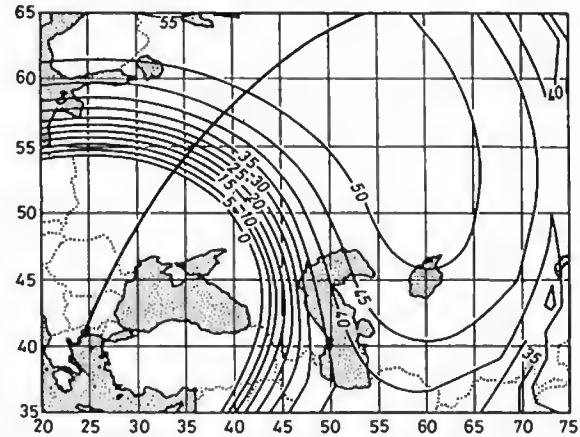


Fig 1. Calculated contours of the field strength (in dBu) for a high-power Voice of America transmission from Kavalla, Greece on 11.855MHz at 2000gmt for March 1985. Calculations assumed a 250kW transmitter and a curtain antenna. The diagram shows clearly that at the boundary of the skip (dead zone) the signal strength increases progressively as the distance from the transmitter increases. The close spacing of the contours in this region suggest that deep fading can occur rapidly with any change of ionospheric conditions, a phenomena that characterises operation on the amateur 10.1MHz band (Source C M Rush)

This is evident from Fig 1, taken from Charles Rush's paper, showing calculated contours of field strength (in decibels relative to 1μV) for a very high-power (250kW) Voice of America transmitter located at Kavalla, Greece and targeted on the USSR, on a frequency of 11.855MHz at 2000gmt for March 1985, with a curtain antenna array. The point to note is the way in which field strength increases from 0dBu to 50dBu over some hundreds of miles and indeed only reaches 55dBu at the very top of the map. The same general pattern, though not the same dBu!, would apply to stations using 25 or 250W rather than 250kW, although the shape of the coverage area is, of course, partly determined by the antenna array.

## Getting to grips with the ionosphere

Although the ever-changing structure and state of the ionosphere has a direct bearing on virtually all operation below about 60MHz, most of us have only a hazy idea of what happens "up there" between the transmitting and receiving antennas. The vhf operator soon realises that his signals travel much further in certain weather conditions, but his signals (except in conditions of Sporadic E that remain only vaguely predictable) tend to pass straight through the upper atmosphere, the region that has most effect on mf and hf signals.

So it seems worth quoting in some detail from the introductory passages of Charles Rush's mini-review which describes succinctly present thinking on the ionosphere. He writes (US Government work not protected by US copyright):

"The ionosphere is that region of the earth's atmosphere in which free ions and electrons exist in sufficient abundance to affect the properties of electromagnetic waves that are propagated within and through it. For practical purposes, the ionosphere can usually be assumed to extend from about 50 to roughly 2000km above the earth's surface. The structure of the ionosphere is highly variable and this variability is imparted onto the performance of telecommunication systems whose signals are propagated via the ionosphere. The prediction of the ionosphere and the prediction of the performance of ionospheric-dependent radio systems is often assumed to be identical. Ionospheric predictions are generally made using models that are either physically, statistically, or empirically based. Predictions of

the performance of ionospheric-dependent radio systems are generally made by using the ionospheric predictions in conjunction with other elements (models, formulas, equations, etc.) that permit the determination of system characteristics. Historically, the D region of the ionosphere is treated as the lowest ionospheric region. It has an altitude range from 50 to 90km and the electron density increases rapidly with altitude. The D region is under strong influence of the sun with the maximum values of the electron density occurring near local noon during summer. The ionization in the D region between 70 and 90km is caused primarily by solar X rays; below 70km, cosmic ray-produced ionization dominates. The high collision frequency between the electrons and neutral particles in the D region gives rise to substantial absorption of radio waves that are propagated into it.

"The E region is the next highest ionospheric region. It spans the altitude range from about 90 to 130km. The normal E layer closely resembles a "Chapman" layer with a maximum density near noon and a seasonal maximum in summer. The maximum density occurs near 100km, although this height varies with local time. During the night, the ionization in the E region approaches small residual levels. The normal E layer is formed by ultraviolet radiation ionizing atomic oxygen. Collisions between electrons and neutral particles, while important in the E region, are not as numerous as in the D region. The electron-neutral collision frequency generally decreases exponentially with altitude throughout the E region.

"Embedded within the E region is the so-called sporadic-E layer. This layer is an anomalous ionization layer that assumes different forms—irregular and patchy, smooth and disc like—and has little direct bearing to solar radiation. The properties of the sporadic-E layer vary substantially with location and are markedly different at equatorial, temperate, and high latitudes.

"The highest ionospheric region is termed the F region. The lower part of the F region (130 to 200km) displays different variations than the upper part, and for this reason the terms F1 and F2 (region above 200km) are applied. The F1 region, like the E region, is under strong solar control. It reaches a maximum ionization level about one hour after local noon and its presence is generally only obvious during the summer. At night the F1 and F2 regions merge and are termed simply the F region.

"The F2 region is the highest ionospheric region. It is also the most variable in time and in space. The maximum values of electron density in the F2 region can be as large as  $2-5 \times 10^{12}/m^3$ . The maximum value generally occurs well after noon, sometimes in the evening hours. The height of the maximum ranges from 250 to 350km at mid-latitudes to 350 to 500km at equatorial latitudes. At mid-latitudes, the height of the maximum electron density is higher at night than in the daytime. At equatorial latitudes, the opposite behaviour occurs.

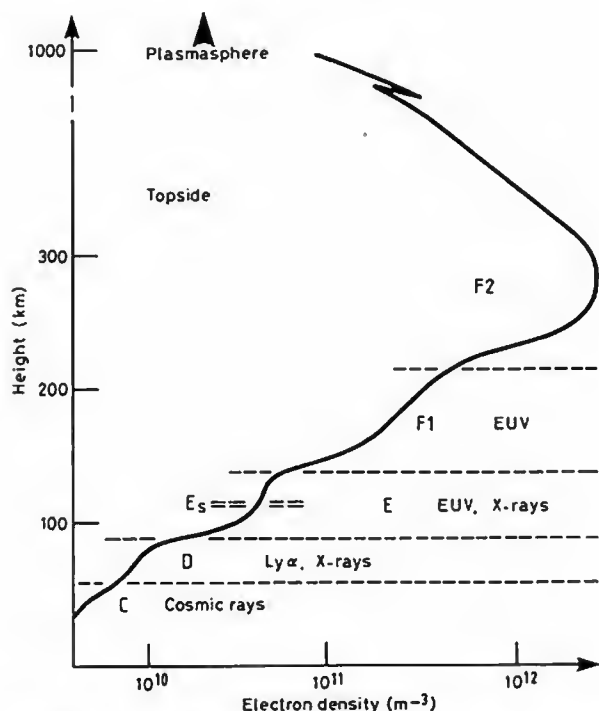


Fig 2. A simplified representation of the vertical distribution of electron density. In practice the vertical distribution will differ in different geographical regions

"The F2 region is strongly influenced by neutral-air winds, electrodynamic drift, and ambipolar diffusion that compete along with ionization processes to control the ionization distribution. The relationship between the direction of the geomagnetic field and the direction of the neutral winds and electrodynamic drifts plays a major role in the resulting F2 region structure. It is the plasma response to the dynamic processes in the presence of the geomagnetic field that gives rise to the observed variations in the F2 region.

"Within the F region, the collision frequency between electrons and neutral particles decreases markedly. However, collisions between electrons and ions, being Coulomb-type collisions, can give rise to relatively high effective collision frequencies. Substantial absorption of hf radio waves can occur, for example, near the peak of the F region.

"The F region extends upward into the topside ionosphere. The topside ionosphere is as variable, if not more so, as the F region. The variations become increasingly larger with altitude. Because the electron density continuously decreases in the topside ionosphere, the ionization in the topside becomes less and less important in terms of affecting most radio propagation systems.

"Fig 2 provides a rather simplistic example of the vertical distribution of electrons in the ionosphere. This particular distribution is characteristic of mid-latitudes at summer noon, solar maximum conditions. At any location on the earth, the vertical distribution can be expected to differ in detail from that of Fig 2. Many of the ionospheric models that have been developed over the years are limited to specific geographical regions because the mechanisms that lead to the formation and changes of the ionosphere tend to vary in their dominance of the overall distribution in specific geographical regions. This is particularly true for the ionosphere in the equatorial latitudes and at the high latitudes."

It is very noticeable how the muf is higher at any given time in southern Europe than in the UK—and, as is well known, north-south paths are frequently open at times when the east-west paths are firmly closed.

## High-energy radiation dx

A note from Jack Darby, G4TVC raises an interesting question about the levels of x-ray radiation that may sometimes penetrate through the Earth's atmosphere from solar flares. He writes:

"I am employed by MEL in Crawley, Sussex as a system test engineer, working on high energy linear accelerators for medical use that can generate high levels of x-ray radiation. On the morning of October 16, a junior engineer working with me was being cautious and checking for induced activity with a G-M radiation monitor. He was surprised to find the level well above the usual 1 to 2 counts per second. The monitor was in fact showing between 12 and 20 counts! There was no apparent reason for this level. We checked with several other monitors and also at a distance of 50 yards from any possible local source of radioactivity. The monitors continued to read 12 to 20 per second.

"The following weekend was JOTA and the Crawley Amateur Radio Club were operating two stations on behalf of the local Scouts. We found the hf bands in a very active state and worked dx in many directions on most bands. 21MHz was open to the USA for most of the daylight hours.

"Could it be that these two incidents were connected? Can a sunspot-type flare cause such an increase in the 'natural' level of radioactivity? If so, we need only purchase one of the surplus pocket monitors for a couple of pounds in order to keep an eye on the dx conditions."

This incident is another confirmation that we have now crossed over from sunspot Cycle 21 to the new Cycle 22.

## Renewed interest in valves?

It may well be technically incorrect to suggest that there has been a noticeable revival of interest in the use of valves in transmitters. Many readers would point out that in practice valves have never disappeared from a significant proportion of amateur stations. This includes the vast majority of those using anything like full legal power, the many who are happy to keep on the air with older but often entirely satisfactory equipment and a lot of those who prefer to keep at least some element of home construction. After all, 10 or 100W of rf power performs equally well or badly whether generated by thermionic or solidstate devices, the only difference is that for ssb operation a valve usually provides better linearity and hence fewer spurious signals or intermodulation products! Nevertheless, there must by now be many of the younger generation of amateurs to whom the thermionic valve is virtually an unknown device on which no questions have been asked for many years in the RAE.

It was therefore interesting to note in *Ham Radio Today* (November 1986, pp21-5) a long article by Brian Kendal, G3GDU on "Roll your own valve rig" covering the basic circuitry of valve oscillators, buffer and power amplifiers (though regrettably with no mention of the advisability of neutralization or parasitic suppression etc). I would also take issue with his

**Table 1. Valve base connections**

Valve base		1	2	3	4	5	Pin 6	7	8	9	TC
EC90	B7G	A		H	H	A	G	K			
EF80	B9A	K	G1	K	H	A	S	A	G2	G3	
EF91	B7G	G1	K	H	H	A	G3	G2			
EF92	B7G	G1	K	H	H	A	G3	G2			
EF93	B7G	G1	G3	H	H	A	G2	K			
EL90	B7G	G1	K	H	H	A	G2	G1			
EL91	B7G	G1	K	H	H	A	G3	G2			
6C5	IO		H	A		G1		H	K		
6F6	IO		H	A	G2	G1		H	K		
6J5	IO		H	A		G1		H	K		
6K7	IO		H	A	G2			H	K		G
6L6	IO		H	A	G2	G1		H	K		
6V6	IO		H	A	G2	G1		H	K		
6BW6	B9A		G1	K	H	H		A	G2	BP	
12AT7	B9A	A2	G2	K2	H	H	A1	G1	K1	HCT	
12AU7	B9A	A2	G2	K2	H	H	A1	G1	K1	HCT	
807	UX5	H	G2	G1	K	H					A
5763	B9A	A		BP	H	H	G2	K	G1	G1	
6146	IO	K	H	G2	K	G1	K	H	B		A

Legend: A-anode; B-base shell; G or G1-control grid; G2-screen grid; H-heater; HCT-heater centre tap; K-cathode; TC-top cap.  
Note the 12AT7 and 12AU7 are double valves thus G1 corresponds to the grid of the first triode and G2 to that of the second etc.

(Source G3GDU in *Ham Radio Today*)

statement that there are no books covering valve techniques in amateur radio transmitters currently in print: both *Radio Communication Handbook* (5th edition) and *A Guide to Amateur Radio* (19th edition) provide valve as well as solidstate circuitry—but perhaps what G3GDU has in mind is the difficulty of finding detailed information on valve characteristics and valve base diagrams which I admit *can* be a problem (even my extensive technical library lacks information, for example, on the once popular TT11).

G3GDU does include some useful suggestions on valve types (though not their detailed characteristics) together with their pin connections (see Table 1) and has at least reassured me that I am not the last surviving member of the valve fan club!

### Grounded-grid amplifiers

Recent references in *TT* (August and November) to stability and flash-over problems in high-power hf and vhf linear amplifiers are to some extent echoed in W6SA1's *Ham Radio Techniques* (*Ham Radio*, September 1986, pp 42-46). Bill Orr, W6SA1 who works for Varian-Eimac, one of the remaining major suppliers of high power thermionic devices, is well-placed to describe the good and bad points of linear amplifiers. He notes, incidentally, that despite the virtual disappearance of valves from current factory-built receivers, exciters and transceivers, it is a different story when it comes to high-power amplifiers where the vacuum-tube remains supreme, in spite of several attempts to market solid-state "kilowatt" amplifiers. "Such a device simply isn't cost-effective; I doubt that a practical 2kW (so-called) solid-state linear amplifier will be available at a modest cost in the near future." He considers that the cathode-driven, grounded-grid amplifier configuration is "admirably suited to the amateur-radio service in the hf and vhf regions. The circuit performs well in a properly designed and operated amplifier". For such an amplifier the valve is often a high- $\mu$  triode which can result in good power gain and is difficult to overdrive. Since the drive power adds to the output power, it is a deservedly popular arrangement when using the typical 100W transceiver as an exciter.

W6SA1 notes that such an amplifier seldom requires neutralization in the hf region since the feedback path from anode to cathode is small but that neutralization may be necessary above 30MHz. He also suggests that "In the better-designed cathode-driven amplifiers, a tuned circuit is used in the cathode to improve the regulation of the driver, to provide proper termination of the driver over the operating cycle, and to complete the anode-circuit rf return path. If the tuned cathode circuit is omitted the various tasks fall upon the output circuit of the exciter. Many solid-state exciters cannot stand this set of operating conditions and may exhibit instability and undesired oscillation. The operator may jump to the conclusion that the amplifier is oscillating even though the problem is really in the exciter."

W6SA1 stresses that generally speaking the cathode-driven amplifier is a docile beast, with relatively low power gain (compared with a grid-driven tetrode amplifier) when triode valves are used and shielding is adequate. He writes: "Amplifier instability at the operating frequency can often be cured by careful attention to feedback paths external to the amplifier (proper bypassing of primary power leads) and by ensuring that the exciter and amplifier are operating at the same earth potential. An extra-short, heavy

earth strap between exciter and amplifier will often cure an unstable amplifier."

On amplifier parasitics W6SA1 takes a pragmatic view; "Much has been written about amplifier parasitics. Some of it is true . . . parasitics, when they occur, are usually mild and commonly above the self-neutralizing frequency of the valve.

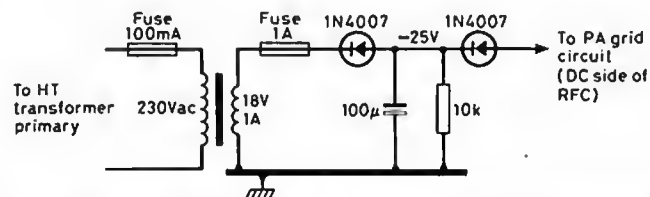
"A sure-fire cure for a parasitic is to load the circuit at the parasitic frequency until the amplifier refuses to oscillate. The valve lead common to all parasitic circuits is the anode; this is where parasitic suppression should take place. A simple resistor-inductor circuit will do the job." But he notes that too many turns round the resistor will cause it to overheat; too few turns and the parasitic will not be suppressed.

On "flash-over" in this configuration, W6SA1 recommends the insertion of a small series resistor in the anode supply line to limit the sudden discharge of the high-energy psu filter capacitors: "In most cases a 50 $\Omega$ , 20W resistor in the ht + lead after the filter capacitor (either in the amplifier or psu) should provide adequate protection . . . to a power valve that may be worth many hundreds of dollars." He also notes the use of a small amount of rf negative feedback which can absorb some excess drive power, tends to make the amplifier more stable, and improves the intermodulation distortion (imd) figure slightly. The feedback circuit makes use of the anode-to-grid capacitance and is often arranged to provide about 2 to 3dB feedback. This is set by the value of the grid by-pass capacitance which may be say 600pF in an amplifier using two 3-500Z high- $\mu$  power triodes. Decreasing the grid capacitance increases the feedback but tends to degrade the grid-filament isolation at the operating frequency.

All of which underline a point made a number of times in *TT*, that high-power amplifiers may use very simple circuitry but require the application of good engineering practices—and of course adequate safety precautions.

### Valve failures

It was noted in the November *TT*, under "neutralization of rf amplifiers", that W2YW had reported in *Ham Radio* experiencing some three dozen big-bang failures of high-power 572 valves in grid-driven linear amplifiers despite the incorporation of neutralization and parasitic suppressors. He ascribed the problem to a manufacturing change in about 1981 that had raised the amplification factor of the 572 from 160 to 200, presumably by reducing the inter-electrode spacing.



**Fig 3. LA8AK's suggested arrangement for providing a minimum grid bias voltage as a protection circuit for high power linear valve amplifiers**

A similar report has come to me from Jan Martin Noeding, LA8AK in respect of the RCA 8122 high-power tetrode. He writes: "This valve causes so many headaches that I consider that it should be avoided by radio amateurs. Experience from Farsund Radio (LGR/LGZ) and a Danish manufacturer of coast station transmitters suggests that between 30 and 50 per cent of the valves have become defective by the time they are delivered in Europe! Of the remainder, 20 to 30 per cent experience a destructive break-down during the initial tune-up, even when care is taken to switch on the voltages in sequence over an hour before applying a small amount of rf drive. The problem almost invariably turns out to be a short-circuit between grids 1 and 2. I consider that for amateurs the best solution is to use a 4CX250B rather than an 8122, but the following suggestions may be found useful: never buy a new or second-hand high-power valve without testing whether there are any internal short-circuits before you leave the shop. If two or more valves are operated in parallel with separate screen-grid regulators, use a protection circuit such as that in Fig 3 which keeps the control grid voltage at a minimum of -25V (relatively low impedance source). Otherwise you are likely to burn out those valves that had no short-circuit in the first place. Zinc-oxide varistors used to protect the screen-grid may help in avoiding break-downs. An input drive voltage control circuit should also be used. For the 4-400 valves I have found that it is inadvisable to push this valve straight down into its socket as you are quite likely to bend down the socket connectors with the result that with the passage of time the valve pin may no longer make contact with the socket, resulting in the possible break-down of the valve."



## Instability in small-signal transistor amplifiers

The August *TT* (pp 571-2) included an item on instability in solidstate power amplifiers that listed a number of practical safeguards when using solidstate rf power devices near their maximum ratings. This recognized that it is still all too easy to destroy expensive devices. However, as Henry Higgins, G4ZVL points out it is well worth considering how to prevent spurious transistor oscillation even for small-signal amplifiers and other circuit arrangements. He writes: "It is not often appreciated that a bipolar transistor with reactive loads on its emitter and/or collector may exhibit instability. A reactive load may simply be a length of print-circuit trace or wire and not necessarily in the form of lumped component-elements such as inductors and capacitors, at the frequency in question.

"The effect is to generate at the base a negative resistance and reactive components. If the base input is such that it will cancel out these components and its resistance is equal in magnitude, but positive, then the transistor will oscillate.

"So if the base has a negative resistance and the input network is its 'mirror image' then it will cause problems. The base input does not, in effect, consist only of the capacitors, resistors, etc, but—as the frequency increases—trace lengths and wire length also contribute. (Remember that even a straight 1in length of 23 swg wire has an inductive reactance of about 16Ω at 100MHz—G3VA). In such circumstances the transistor may well oscillate at a high frequency, likely to be at vhf or uhf where the 'mirror image' occurs.

"The cure for this is fairly straight-forward and comprises inserting a 100Ω resistor in the base lead as close to the pin as possible to be effective, preferably within 2mm of it. It is of little use inserting such a resistor 50mm down a trace, it may even make things worse. It is good practice to include this in all small signal transistor amplifiers, and any other design where a reasonably low base current is used; exceptions include high current power regulators where the beta and the Ft of the device are both low.

"Also remember the oscillation will usually occur at a very 'high frequency and so may not be visible on a 100MHz scope, for example, and if a digitizing instrument is available—even less chance; it should be possible to see the oscillation with a good spectrum analyzer! If a transistor is oscillating it can have several effects; first it will generate a high frequency which may well cause problems with other parts of the circuit; or it may cause rfi and the transistor itself will have reduced gain where it is needed. One final point, assuming the amateur has the appropriate test equipment, it is still not easy to find out which transistor is oscillating as the additional capacitance of the probe, even at another part of the circuit, may stop the oscillation. So fit the base resistors as standard."

## Magnetic (loop) antennas

The description of magnetic (small loop) antennas (*TT*, October, pp 705-7) was intended primarily to show the practical advantages and disadvantages of the compact loop transmitting antenna formed from large-diameter copper tubing or similar materials of very low ohmic loss, necessary to achieve reasonable efficiency in spite of the very low radiation resistance. However, Dr Andrew Smith, G4OEP is rightly concerned that some of the comments could inadvertently give rise to misconceptions as to the fundamental principles governing all transmitting antennas. As he puts it:

"*TT* occasionally reminds us about the mystic fog which surrounds the vswr fetish, but it is possible now that you might be in process of creating a myth around loop antennas.

"Possibly, the term 'magnetic antenna' has become established as a generic term for loops, ferrite rods etc in which, during reception, the device generates an emf in response to the magnetic field vector component of an incident electromagnetic wave. If the term has become established, there is little one can expect to do to influence its usage. But it is less than ideal when applied to transmitting antennas, which have the dual task of creating E and H fields in strict proportion ( $E/H=c$ ) if they are to act as em radiators. If a magnetic antenna creates an H field in excess of  $E/c$  then the excess magnetic field cannot result in the radiation of em energy, and so is accidental to the operation of the device as an antenna. As *TT* suggested, this can be a source of inefficiency in such aerials.

"This is fairly obvious, but should be borne in mind when discussing the operation of these antennas. The statement '... the system is no longer a true magnetic antenna, and electric fields develop in the neighbourhood of the antenna' ... suggests that a purely magnetic transmitting antenna might in some way be possible. It would be unfortunate if *TT* were to be caught in the act of perpetrating an antenna mythology!

"I also feel uneasy about the discussion of coupling a loop antenna to a receiver. Surely the idea suggested by '... the first-stage tuned circuit needs to be high-Q so that its losses, coupled back to the antenna, do not reduce efficiency' could be more accurately stated by something such as 'the source resistance of the antenna is unusually low, and so must be

appropriately coupled to the first stage of the receiver'. Losses in the input circuit of a receiver must always be low in order to avoid inefficiency, but allowing the input resistance of the amplifier (and source resistance of the aerial) to lower the Q of the input filter is one way of avoiding losses! I think your point is really one about impedance matching and power transfer. "Finally, could a loop antenna radiate if it were enclosed in an electrostatic screen as most of receiving loops are?"

To the best of my knowledge, the term "magnetic antenna" originated in Germany and is widely used there. Incidentally, I was interested recently to have a 10·1MHz contact with a German amateur (DL8WR near Darmstadt) who was using a 1·4-metre diameter loop antenna mounted on his balcony—and putting excellent signals into the UK.

## Breakover diodes for transient protection

In the early days of silicon power diodes, when most of these devices were rated to withstand only 400 peak inverse volts (piv), a good deal of attention had to be paid to making sure that equipment could cope with the momentary voltage surges which occur at irregular intervals on the electric supply mains; overvoltages that are usually much too short in duration to affect ordinary electric appliances or lamps.

As noted many years ago in *TT* and *ART* transient overvoltages often arise during power supply switching operations or from the indirect effects of lightning strikes and by induction, even where the conventional electricity supply lightning arrester has functioned correctly. Because of the greater use of overhead lines in rural areas, such areas tend to suffer from more and longer lightning transients than urban areas. One investigation showed that at Dudley in Worcestershire during a period of six weeks the following substantial overvoltages were recorded: 35 of 20 to 40 per cent above normal; 7 of 40 to 70 per cent above normal; and one of over 100 per cent above normal. At Cheam, Surrey in a period of 12½ weeks, there were 27 of 20 to 40 per cent above normal; four of 40 to 70 per cent; and eight of 70 to 100 per cent. Since a 100 per cent overvoltage on a 240 volt supply is equivalent to 480 volts rms or almost 700 volts peak it can be appreciated that although lasting only a few microseconds, silicon diode rectifiers need to be protected against such transients unless they have a high piv rating. Modern diodes are usually rated at 1000 piv and the problem has become less severe.

Nevertheless, quite a lot of equipments, including home computers etc, are not happy with mains supplies having high overvoltages and there are, for example, sockets now being marketed that give a "clean" supply, eliminating overvoltages and peaks of electrical interference etc.

Mullard have recently announced a range of "breakover diodes" (bod) developed specifically to provide fast transient over-voltage protection for data transmission equipment but which are also suitable for electronic equipment requiring transient impulse protection. The bod's are available in voltages between 100 and 280V in 20V steps. Being bi-directional they protect against transients of either polarity. Based on thyristor technology, in their normal high resistance state they pass less than 50μA of current at 85 per cent of breakover voltage. Within 5ns of a transient exceeding the breakover voltage the device switches to a low resistance "on-state", but switches back to "off" when the current through the bod falls to less than its holding value. It is claimed that the bod provides a faster, more stable form of protection than voltage-dependent resistors (vdr) often used for transient protection and can also replace zener diodes in some applications. This information comes from a Mullard press announcement and I have no practical experience of their application but it does seem to be a useful development for situations where equipment is known to be sensitive or vulnerable to short duration impulses. The possibility of using such devices to reduce the risk of valve flash-over might also be worth considering.

## Folded-back dipoles

One of the lessons that can perhaps be learned from the work on small loop transmitting antennas, which could be expected to have a radiation resistance of less than 1Ω, is that this is not necessarily a bar to achieving a reasonably effective antenna system. This is always provided that we recognise the problems and limitations that stem from the low radiation resistance (which must not, of course, be confused with the feed point impedance).

In *HF antennas for all locations*, Les Moxon, G6XN rightly does not recommend the use of dipoles physically shortened by folding back the ends to a central insulator, since he believes that there are more efficient ways of end loading. He shows that in the folded back arrangement significant current flows in both directions, thereby decreasing the radiation resistance by a factor of about four when compared with some other forms of end-loaded elements which he describes (pages 148-9).

Dr Constantino Feruglio, 1V3VS, recognizes the force of this argument, but nevertheless believes that such a system when designed for 1·8MHz (or

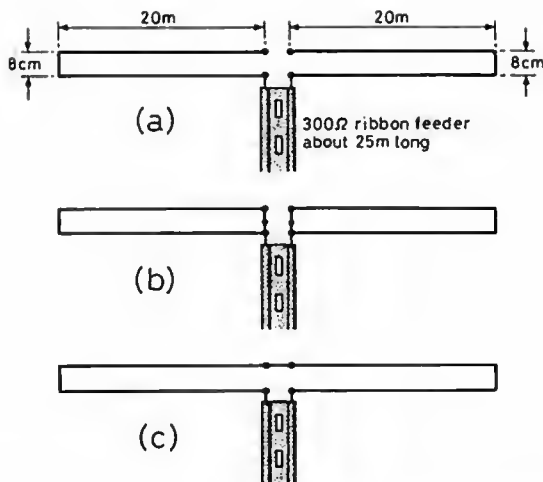


Fig 4. (a) The folded-back dipole as used on 1.8MHz by IV3VS. (b) Switched into the "double Zepp" configuration (c) Switched into the "folded dipole" configuration for 3.5MHz operation

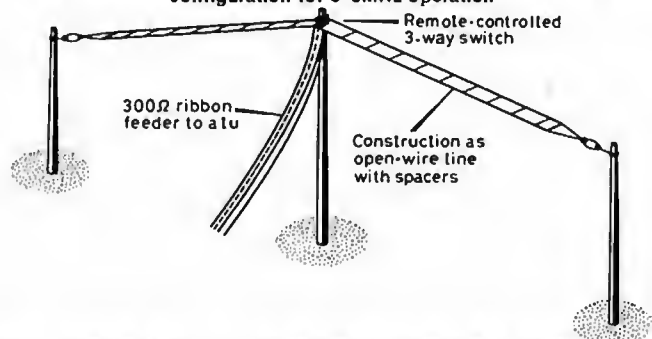


Fig 5. Implementation of IV3VS's multiband folded-back dipole antenna. As usual, performance is improved when the antenna is as high up as possible

possibly 3.5MHz) with a top span of 40m (or 20m) can form the basis of a useful multiband antenna since, when used in conjunction with a remotely-controlled switch it can work not only on 1.8MHz but also on 3.5, 7, 14, 21 and 28MHz (and with suitable atus on 10, 18 and 24MHz —G3VA). IV3VS uses the K8ANG balanced-output atu circuit shown in the June *TT*, Fig 9(b), page 420.

With the folded-back top of Fig 4(a), IV3VS achieves good 1.8MHz contacts throughout Europe. Switched into the arrangement of Fig 4(b), the system becomes a "double Zepp" antenna for 3.5, 7, 14, 21 and 28MHz etc. Alternatively it can be switched as in Fig 4(c) to provide a 3.5MHz half-wave folded dipole with useful broad-band characteristics. Length of the balanced feeder (slotted 300Ω ribbon line or open-wire feeder) is not critical since the entire system can be resonated on virtually any frequency by means of the atu, permitting operation in the (b) configuration also on 10, 18 or 24MHz. For limited spaces, the "top" could be reduced to 20m overall in which case the folded dipole configuration would be for 7MHz and efficiency on 1.8MHz would be lower. With a two-way rather than three-way remote-controlled switch the folded-dipole configuration could be omitted. Fig 5 shows the system as used by IV3VS.

## Real zero ssb transceivers

Richard Lambley, G8LAM has drawn attention to an interesting concept described by three Japanese engineers working for NTT in *IEEE Transactions on Vehicular Technology* (February 1986, pp22-28): "A real zero ssb transceiver for land mobile radio: a simple method of demodulating ssb signals without an envelope" by Kazuhiro Daikoku, Shigeaki Ogase and Hitoshi Ohdate. I must confess that I find their theoretical explanations of "real zero ssb" a little daunting. But what it seems to imply is simply a form of single sideband transmission that uses a full level carrier yet occupies no more bandwidth than its band-limited audio modulation, ie 3kHz speech, and is entirely suitable for the 5kHz vhf mobile channelling that has long been an objective for the professional two-way mobile radio services.

A major difficulty with conventional suppressed-carrier or pilot-carrier ssb systems when used for mobile operation is the problem of coping with the pronounced multipath fading that is virtually always experienced when working mobile on vhf/uhf (see *TT*, November 1985, page 866). With

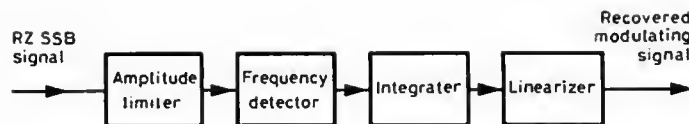


Fig 6. A simplified block diagram of one method of demodulating real zero ssb. This uses a frequency detector and is compatible with fm

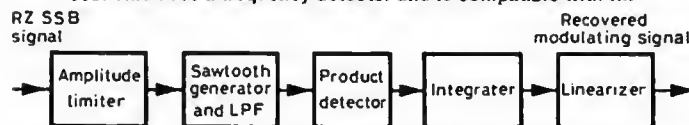


Fig 7. Alternative method of recovering modulation from an rzssb signal using a product detector but requiring a sawtooth generator and low pass filter

conventional fm (nbfm) the ability to put received signals through an amplitude limiter provides an effective form of agc so long as the signal remains above the threshold.

Suppressed-carrier ssb requires that the signal is processed linearly and its "envelope" restored by injecting a local carrier. An advantage of rzssb is that it can be demodulated in much the same way as an fm signal (Fig 6) the essential functions being an amplitude limiter, frequency detector, integrator and linearizer. Alternatively, it is possible (Fig 7) to use product detection as normally used for ssb provided that the amplitude lost at the limiter is recovered; the most essential component of this approach being a sawtooth generator and low-pass filter.

For rzssb transmission the signals can be amplified using highly efficient polar-loop transmitters as developed by V Petrovic at the University of Bath (drawing on earlier work by the American L R Kahn), described on several occasions in *TT*, a technique that permits power amplifiers to be operated in the high-efficiency Class C.

No detailed circuitry is provided in the Japanese paper (their experimental transmitter was of the phasing rather than filter type). The authors conclude: "An rzssb transceiver has been theoretically and experimentally proven to be a viable spectrum-efficient technology. The attractive features of such a transceiver are:

(1) With the rzssb transceiver, signals can be transmitted in a bandwidth comparable to the information bandwidth.

(2) In the rzssb transceiver, an amplitude limiter can be used to remove amplitude degradation caused, for example, by fading.

(3) Frequency discriminators can be used to demodulate rzssb signals. A cumbersome carrier recovery operation is not necessary even though rzssb signals belong to linear modulation systems. Therefore, the rzssb receiver is compatible with fm receivers."

It remains to be seen whether rzssb is taken up widely either by professionals or amateurs. There are alternative forms of amplitude-companded ssb, including a system developed in the UK at the University of Bristol, that have been shown to be effective for mobile operation with 5kHz channelling though such transceivers tend to be significantly more expensive than the commonly used fm mobile systems with 25kHz or 12.5kHz channelling. Nevertheless, rzssb seems attractive and it claimed that it is a method which can be easily implemented.

## Morsum Magnificat

The October *TT* item on "Clutter elunk" (page 708) had N7ESJ suggesting that hi-tech, high-speed data and machine telegraphy could herald the disappearance of the "cultured and civilized tones of the radiotelegraph signal". Tony Smith, G4FAI seems to share these sentiments on an international level. In sending along the first issue of the English-language edition of *Morsum Magnificat*, a quarterly magazine that first saw the light of day in Holland, he writes: "We want to encourage an interest in morse beyond the practice of operating a key (although that will never be overlooked). Morse has a history, a culture, a technology of its own. We want to enlarge the horizons of the world of morse for today's operators, who sometime seem unaware of their rich heritage!" As one who has never regretted the time spent in gaining familiarity with the code as a teenager in the 'thirties, I would go along with his sentiments except that I believe that the international code we use, based on letter frequency in English (ie the single dit for the most used letter-E), owes more to the unremembered Alfred Vail, who worked with Morse, than to Samuel himself. Alfred was the practical engineer, Samuel the artist turned advocate of telegraphy. But life is like that—few would recognize ourselves as Vail operators! (*Morsum Magnificat* No 1, Autumn 1986, edited by Tony Smith, G4FAI, 1 Tash Place, London N11 1PA, telephone 01-368 4588, annual subscription £6).



# RSCGB News Bulletin

PAGES



DTI NEWS



First of all, some news on CEPT licensing - as you probably know, this topic relates to operation by UK amateurs in other countries.

The Society has been pursuing matters in this area with the DTI for some time, and indeed had a meeting with them recently on the subject. At the present time the UK has not adopted CEPT Recommendation T/R 61-01, Nice 1985, and as a result the normal "reciprocal licensing" agreements which we've had for some time are still in force. However, the UK now has a special unilateral agreement with West Germany which has replaced the old reciprocal licence agreement. Although this isn't part of the CEPT agreement, it does permit UK licensees to operate in West Germany without the need to apply for a West German licence in advance. What happens instead is that the DTI issues a letter which authorises operation in West Germany subject to the terms and conditions which apply to West German amateurs. The text of this letter has been agreed by the German authorities and it's available from the DTI on request.

If you're intending to visit West Germany and operate whilst you're there, it's your responsibility to obtain the letter of authority from the DTI and also to obtain the relevant information from the West German PTT with regard to operating conditions - we'll be publishing this information ourselves, however, as soon as possible.

The DTI intends to make changes to the UK amateur licence which will eventually make it possible for UK radio amateurs to operate in those CEPT countries which have adopted the recommendation we mentioned above - and, for that matter, vice versa - WITHOUT having to obtain a reciprocal licence first. In the long term this system will replace most of the current European reciprocal licensing agreements.  
(...cont p858)

## PACKET RELAYS ARE GO!

### 10 cleared for operation, more to follow

Packet radio enthusiasts will be delighted to know that ten out of the planned fourteen experimental 144 MHz packet relay stations have now been cleared for operation by the DTI - and the other four might also be on the air by the time you read this. The initial ten were scheduled to come on the air as of 1200 on Saturday 22 November, with the other four to follow shortly after that assuming that clearance came through in time.

So at least these relay stations should have become operational as of 22 November;

GB3AP - Dudley, West Midlands  
GB3BP - Bristol, Avon  
GB3DB - Honiton, Devon  
GB3DC - Weymouth, Dorset  
GB3EP - Exeter, Devon  
GB3HP - Winchester, Hants  
GB3HQ - RSGB HQ, Potters Bar  
GB3JP - Jersey  
GB3NP - Norwich, Norfolk  
GB3UP - University of Surrey

As well as those, the following may well be on by now;

GB3CD - Crewe, Cheshire  
GB3KP - Kingston-on-Thames  
GB3XP - New Malden, Surrey  
GB3YP - Harrogate (\*145.275 MHz)

All these units form part of a short-term experiment due to finish at the end of 1987; the intention is that both the Society and its members and users can get used to packet digipeating. After the end of the experiment, a permanent packet relay station network covering the UK will be planned. Most units operate on 144.650 MHz, and the protocol in use is AX25

version 2. Most will be vertically polarised, but 'HQ, 'KP, 'UP and 'XP will be horizontally polarised.

Happy packeting!

Still with relay stations, or at least repeaters, the DTI has now been persuaded to part with some new repeater licences amongst which are more 1.3 GHz TV units. These are;

GB3GT - Glasgow (FM video, channel RMT2)  
GB3PV - Cambridge (FM video, channel RMT2)  
GB3VI - Hastings (AM video, channel RMT1)  
GB3CT - Crawley (FM video, channel RMT2)

One other 1.3 GHz repeater licence has been issued: this one is for speech;

GB3SE - Stoke-on-Trent, Staffs (channel RM3)

The following 430 MHz units have also now been licensed;

GB3HL - Hillingdon, W. London (channel RB3)  
GB3NW - Hendon, NW. London (channel RB5)  
GB3LR - Lewes, East Sussex (channel RB11, and already operational)

As well as these new licences the DTI also approved the move of the West Sussex TV repeater GB3VR from Worthing to Brighton, which has now taken place. 'VR runs FM video on channel RMT2, and reports would be much welcomed by keeper G4WTV.



(from p857...)

Still on the subject of reciprocal agreements, the UK now has one with Papua New Guinea. Not that we imagine that hordes of British amateurs are likely to go there (actually, that should have been a question in the Christmas Quiz elsewhere in the Bulletin - "where is Papua New Guinea?") but anyway, the UK Class A licence is reciprocally equivalent to a PNG "Full Amateur Station Licence" and the UK Class B to a "Limited Amateur Station Licence". You'd certainly be a choice piece of DX if you went there - any offers??

Finally from the DTI, they've granted a permanent special-event callsign to the Scout Headquarters station at Gilwell Park - so if you hear GB2GP on the air, give them a shout.

## Greek reciprocal - 1987?

One of our members in Greece has informed us that the Greek Government intends to pass a law in the next month or so which will provide for two grades of licence similar to the UK Class A and B licences.

The two grades of licence are also said to be likely to be compatible with the CEPT recommendations relating to reciprocal licensing - see story on page 857 - and it is expected that the Greek licensing authorities will opt for this means of allowing amateurs in other CEPT countries to operate in Greece without the need to apply formally for a reciprocal licence.

More details as soon as we have them but things look promising for UK amateurs who would like to operate SV/ next summer.

## 53rd PRESIDENTIAL INSTALLATION

The installation of the Society's President for 1987, Mrs Joan Heathershaw, G4CHH, will take place on 17 January 1987 at the Gimcrack Rooms, York & Ainsty Suite, York Racecourse - the cost per head will be £6.00 and tickets are available from Heather Norman at RSGB HQ.



The pic above (tnx G3OJI) shows Anja Fuchs, DL4EBE, listening on 14 MHz at GB3RS during her visit to RSGB Headquarters in August.

Anja comes from Wulfrath near Dusseldorf - which is twinned with Ware in Hertfordshire - and was visiting the UK as a guest of Jim, G3OJI, the Chairman of the Cheshunt & DARS, and his family. Regular skeds have been held between amateurs in Ware and Wulfrath for over two years, and Anja took out a UK reciprocal licence so that she could contact her friends back home whilst here in England.

## MAIDENHEAD - NOW WORLDWIDE

At the recent IARU Region 2 Conference in Buenos Aires, the "Maidenhead" locator system (which was originated largely by our own John Morris, GM4ANB) was accepted and adopted for use in Region 2. This means that the Maidenhead system has now been accepted by all three IARU Regions and can now be said to be a truly worldwide system.

Which is our cue for a nice sales plug for our maps! The Society probably has the best range of amateur radio-related maps in the world, especially as far as the Maidenhead system is concerned. We do a splendid map of Europe, which shows the fields and grid squares (e.g. if you take IO82MR as an example of a Maidenhead locator for a particular place, the "IO" and the "82" are the field and grid square respectively). We do two versions of this: one is a wall map and the other is a smaller "desk map". The other locator map, which is available either as a folded version or a flat wall-mounting type, covers Western Europe and shows the smaller sub-squares (i.e. the "MR" of the example above) as well as the fields and grid squares.

As well as Maidenhead-type maps, we also do a World Prefix Map in full colour, which shows amateur callsign prefixes, countries and - in the new improved version - Maidenhead fields. Finally there's a Great Circle Map, which has a hard-wearing laminated surface so that you can plot bearings and beam headings with a chinagraph or whatever.

Prices for these items are as follows (all inc. p & p)

- \* Locator Map of Europe (wall) - £1.76 to members, £2.07 to non-members.
- \* Locator Map of Europe (desk card) - £0.64 to members, £0.75 to non-members.
- \* Locator Map of Western Europe (folded or flat, please specify) - £2.75 to members, £3.24 to non-members
- \* World Prefix Map - £2.28 to members, £2.68 to non-members
- \* Great Circle Map - £2.18 to members, £2.57 to non-members

WARNING - we rather think that prices of all these items may increase slightly early in the New Year, so buy now!

RADIO COMMUNICATION December 1986





# MORSE TESTS

The following list shows the dates and locations of all the available test centres from 10 January to early March 1987, as we went to press. If you want to take a test and any of the centres shown is within striking distance, send for an application form straight away. Completed applications will be dealt with strictly on a first-come first-served basis.

If there is no appropriate centre for you please contact RSGB Headquarters in a few weeks. By this time we may well have been notified of some additional centres, one of which may be more convenient for you.

Morse tests will be carried out in groups of three and will be of half an hour's duration. Details of the test, the venue and how to get there will be sent to you as soon as your application has been processed and your place confirmed.

COUNTY	TOWN OR LOCATION	DATE
Isle of Wight	Binstead	10/01/87
Hants	Winchester	10/01/87
Co Antrim	Belfast	10/01/87
Mid Glamorgan	Rhydyfelin, Pontypridd	11/01/87
Buckinghamshire	Bletchley, Milton Keynes	11/01/87
Central	Stirling	13/01/87
Derbyshire	Clay Cross, Chesterfield	14/01/87
Bedfordshire	Luton	15/01/87
South Yorkshire	Sheffield	15/01/87
Cornwall	Liskeard	17/01/87
Shropshire	Telford	19/01/87
South Glamorgan	Penarth	20/01/87
Merseyside	Huyton, Liverpool	20/01/87
Kent	Dover	21/01/87
Grampian	Aberdeen	22/01/87
Avon	Northville, Bristol	23/01/87
Leics	Wigston Magna, Leicester	24/01/87
Lancs	Oldham Rally	25/01/87
Devon	Plymouth	28/01/87
Herts	North Watford	30/01/87
West Midlands	Sandwell	31/01/87
Co Durham	Peterlee	02/02/87
Guernsey, Channel Is	St Martins	05/02/87
Cambs	Cambridge	06/02/87
Cheshire	Macclesfield	07/02/87
North Yorkshire	York	14/02/87
Nottinghamshire	Mapperley, Nottingham	14/02/87
N. Humberside	Leconfield, Beverley	15/02/87
West Sussex	Horsham	22/02/87
South Glamorgan	Barry Rally	01/03/87
Tyne & Wear	Blue Star Rally	07/03/87

It is likely that more centres will have been notified to RSGB Headquarters since we went to press, so do give us a call for an application form or for further details.

It might be worth noting something our Chief Examiner has passed on to us. A high proportion of those who fail the Morse test do so because of poor sending. Considering that beginners usually have much more trouble with learning to receive Morse than they do with sending it, this is slightly surprising. However, it's a fact that you might like to bear in mind as you're practising and generally getting ready for the great day. If you are having problems with sending, it wouldn't hurt a bit to ask people at your local club to give you a hand. Conversely, don't forget that you can practice as much as you like on the air under the terms of the Class B licence - the concession whereby you can practice Morse in that way is now permanent. If you need to brush up on the guidelines relating to using this facility, take a look at the May, June and July 1986 editions of the Bulletin.

# Helplines

CQ CQ - calling any Madley-trained RAF Wireless Operators.

Mr Peter Durham of Abergavenny is researching the history of wartime RAF Madley and, whilst he is able to gain plenty of official information from RAF records, he is anxious to hear more about what it was really like. Anecdotes or photographs will be very welcome, and the photographs will be copied and returned. If you are able to help, please contact:

Mr F E G Cox, G3WRQ  
35 Thompson Place,  
Hereford HR4 0JP

The Clapham & Battersea Adult Education Institute is in desperate need of a tutor to take over its RAE classes.

The classes will be held on any suitable evening, and the usual fees will be paid to the tutor.

Full details from Peter Fifield at the Institute, and a message can be left for him on 01-622 2965.

The RSGB's Technical and Publications Committee is looking for some new volunteer members.

The job involves attending meetings, reviewing articles, building and testing constructional projects and helping to shape the future of the Society's publications.

Applicants should have a good basic knowledge of amateur radio. Further details can be obtained from:-

Peter Chadwick, G3RZP  
Three Oaks  
Braydon  
SWINDON  
Wilts  
SN5 0AD



## RAYNET ELECTION NEWS

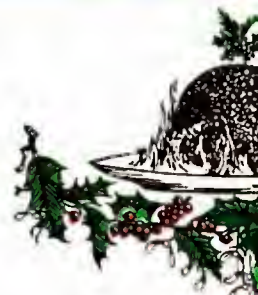
Following the call for nominations in Raynet Zone 2 (Yorkshire & Humberside), one valid nomination only was received by the close.

Mr P J Sheppard, G4EJP is therefore elected unopposed as the Raynet Zone 2 Representative.



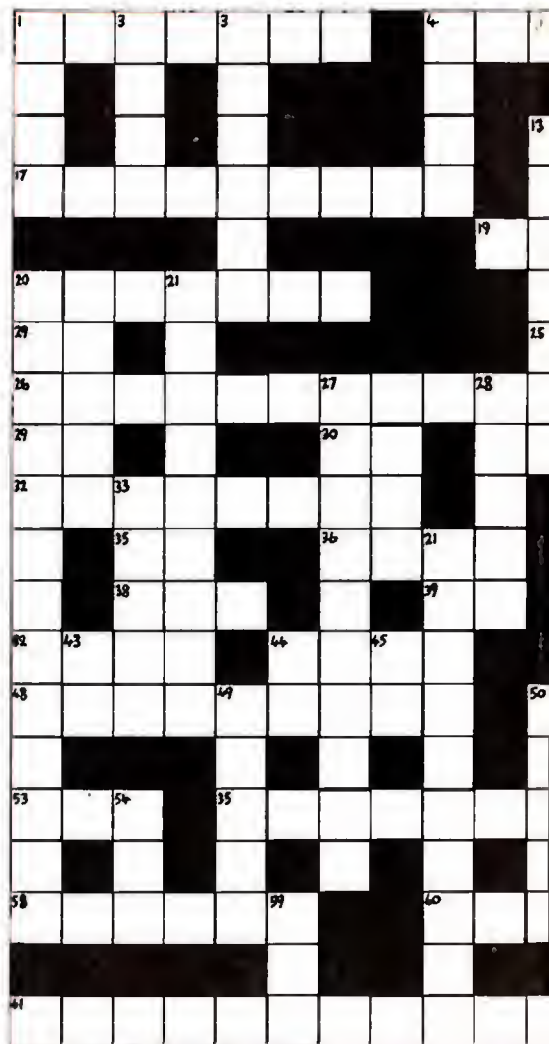


# Christmas



## ACROSS

1. Thermionic, quadruple and (usually) kinkless (7)
4. There's resistance to an alternating current as a small jovial goblin with symbolic energy trips the light fantastic (9)
9. Shortened low frequency might repeat in Staveley, Cumbria (2)
11. Shorten the place where the Parliament is Tynwald - prefix GD (3)
12. This Essex repeater on RB10 sounds partly desperate, partly in the earth (2)
14. Common polarity of silicon amplifying and switching device (3)
16. What you need to do when you're transmitter operator in a DF contest - and when they find you some contestants might feel like having yours (4)
17. This VHF VFO circuit of the valve era looks on paper like a multivibrator and sounds like a modified microwave tube (9)
18. Missing part of Max's Head...and you need it to manoeuvre. Most of us call one a shack (4)
19. Four-sevenths of a transistor electrode is a verb meaning to give off (4)
20. Remember your Latin? A lover who is not paid for it, frequently found on the radio (7)
22. It's omnidirectional and broadband but it looks like something the chimney sweep left behind (7)
24. Abbreviated crystal oscillator and commanding officer (2)
25. Riot all mixed up at Matlock and elsewhere - a unity or a trinity? (4)
26. Electrons have this when travelling between A and B instead of being instantaneous, although an astrologer might have different ideas (7-4)
29. Is this the Systeme Internationale in reverse? (2)
30. Romeo India's sunspot number (2)
32. Straight up! Repeater antennas are normally polarised this way, not horizontal (8)
34. These in the plural make big guns from little pistols without distortion, could be said to be the opposite of circular (7)
35. Abbreviated Europe (2)
36. Rare gas (elementary, really) often indicating mains on (4)
38. Initialised quiet device with gain, usually found near dish (3)
39. Is this Somerset repeater on RB13 very special, or is it just a structure across a fluid? (2)
40. Put the handcuffs on lightning and stop it, citizen or policeman (6)
42. Sounds as though this organisation came out of the Ark, but its satellites watch the weather (4)
44. Can you see where the contest is taking place? Clairvoyants have second (4)
46. Three-quarters of risk adopted a new policy earlier this year, to RSGB dismay (3)
47. Abbreviated English translation of French FOT suggests where best to operate between two points (3)
48. Greek door plus a bit of transistor controls power, at least one way (9)

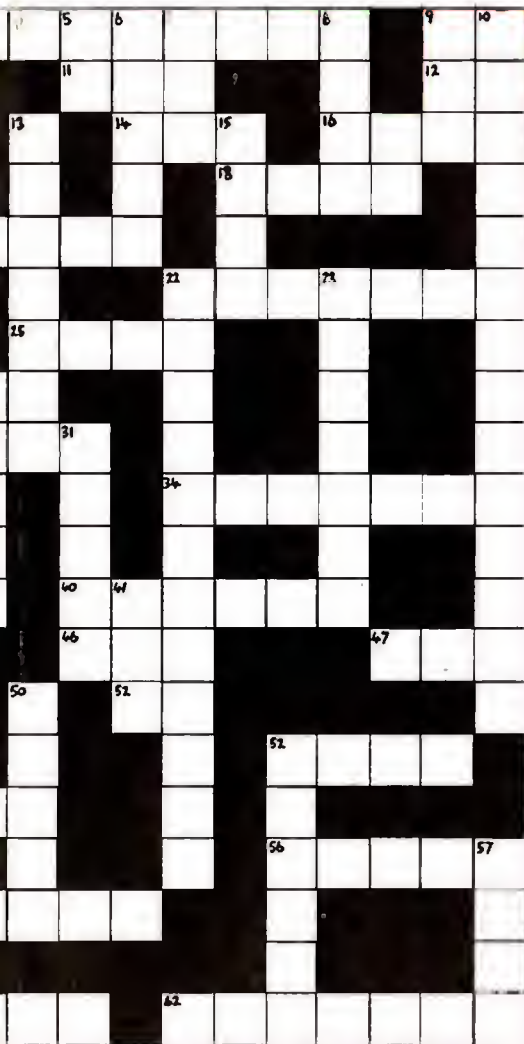


51. It might be a repeater callsign one day, but for now you'll find it connected with two wheels on the Isle of Man - or half the QE2's callsign (2)
52. This transistor electrode sounds as though it's made of non-precious metal; you could mount and support something on it although it's a bit low (4)
53. Logically, neither and nor or - this is a definite negation (3)
55. Half a carbon compound which makes drinks fizz and can keep resistors cool when you're trying to see how quiet you can be (7)





# Crossword



## DOWN

1. L and C together, but not necessarily containing a fluid (4)
2. Animals and squelches have one, usually (4)
3. Double the frequency? Sounds more like eight to me - must be those musicians again (6)
4. Modified Japanese radio maker becomes Russian religious symbol (4)
5. Two simplest Morse letters south of Belfast? (2)
6. You could eat this American toroid, although it's longer in English (5)
7. Chop off front of amplifier and symbolise current flow, perhaps (3)
8. Suppress this phonetic (or mythological character) on a telephone line (4)
9. Heavy metal lights up to replace filament bulb (3)
10. Keying mode or QSY? Sounds like either (9-5)
13. Very restraining, this part of a proper FM system, but it cuts down on interference (7)
15. Part of the Radio Investigation Service in New Zealand? Yes, and AX25 uses it too (4)
20. Busy aerial (6-7)
21. Silly crossword compiler added an extra R to Mr Oakley's fishy-sounding RadCom project - neither could spell tuner, though! (4-5)
22. Don't put your daughter on the second part of this transmitter circuit related to 3 Down (7-5)
23. Is this incomplete test a complete con? No, but many go to the tops of hills for one (7)

27. Take a transistor and rearrange the last two-fifths and you've got an elegant timebase circuit (10)
28. French hands make lights, radios and many other things work (5)
31. Orbiting phonetic? (5)
33. Pass on this switching device (5)
37. Overcoming interference - on horseback, possibly? (10)
41. Abbreviate ritenuto and tune the receiver independently (3)
43. Three dashes and four dots finish this prefix (2)
44. Queue before giving your frequency, initially? (1-1)
45. Transistor Outline which isn't yet a repeater (2)
49. Phonetic country with amateur premier (5)
50. Onomatopoeic electronic sound of jumping honey-seeker (5)
52. Large oily radio - not owned by G-QRP Club members, perhaps? (3-3)
54. This geological formation is also an abbreviated way of passing teleprinter traffic via the wireless (3)
57. Primitive ancestor of keypad is also Londoner's face (4)
59. Twisted nematic way of giving information (3)

56. Abrasive way to change the frequency of a crystal, but don't do this to your teeth when you're cross (5)
58. You say it radiates? But it sounds Shakespearean - if not positively airborne! Most of us say it in American now, you know (6)
60. Up in T? Yes, put in here, take out elsewhere (5)
61. Abbreviated Edward earths the valve electrode in America - it's one way to make a big PA... (8-4)
62. Extract it and add aluminium to complement analogue.... (7)

RSGB book tokens for £15, £10 and £5 will be awarded for the first three correct solutions pulled out of the hat.

Solutions should be sent to Headquarters no later than Monday 19 January. Please mark the envelope "Crossword".







# Christmas Quiz



Had enough of the Christmas food, booze, wine, YLs, song and all the rest of it? No batteries for the wireless? Band conditions about as bad as your complexion? Not to worry - wash away the post-Christmas blues with our super-mega-hyper-wonderful Christmas Quiz! Specially compiled by Headquarters staff, this is our version of Trivial Pursuit - and boy, is it trivial. BUT - there are book tokens for £15, £10 and £5 for the first three correct solutions opened at a grand ceremony at the end of January. The questions veer between being mildly serious and slightly silly, but there's the odd gem.

Ready? - well, here we go.....

- 1) What electronic components gave Marvin the Paranoid Android's leg some trouble?
- 2) If a byte is eight bits and a bit is - well - one bit, what's a nibble?
- 3) 1986 was the 50th year of BBC television transmissions. How many lines did the first EMI system (i.e. the electronic one, not the Baird mechanical system) use?
- 4a) What is the penicillin-like radio system with which we share part of the 430 MHz band?
- 4b) and how would a Frenchman say SYLEOIS in full?
- 5) What colour is the cover of the Autumn 1986 edition of the Callbook?
- 6) Would you associate AX25 with a) good VHF propagation b) antenna gain c) a type of coaxial cable or d) packet radio?
- 7) What's the Japanese for Flashing Flower?
- 8) If you heard a call sign with a 3BB prefix and you lived in Birmingham (Birmingham UK, not Birmingham, Alabama in case you were wondering....), what beam heading would you use to work it? Answer to within 3 degrees.
- 9) Who is the current Secretary of IARU Region 1?
- 10) Which bird lives in the USSR and can be heard on 14 MHz all too often in the UK?

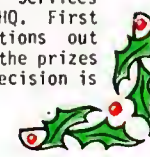
- 11) You're in the throes of building a 144 MHz linear amplifier. The EHT supply for the anodes comes from a transformer with a 1500-0-1500V secondary and you've got a reasonable amount of reservoir capacitance. You're using a biphas half-wave rectifier stack. Neglecting any losses in the stack or the transformer;
  - a) what is the peak voltage across the reservoir capacitor?
  - b) when you wind the amplifier up to 500 mA indicated anode current, what's an approximate value for the ripple current in the reservoir capacitor?
  - c) What frequency is the ripple voltage of the anode supply with respect to the frequency of your local mains?
  - d) What's the minimum number of diodes you should have in the rectifier stack if the ones in your junk-box have a V<sub>rrm</sub> of 1kV?
  - e) assuming they're not fancy avalanche diodes or whatever, which TWO other components should be placed across each diode in the stack?
  - f) when you finally get the beast to work & you're running 300W pep into an antenna with a gain of 15dBi, what ERP are you launching into the troposphere?
  - g) and lastly, would you use a BNC connector for the amplifier's RF output? If not, why not?
- 12) What are the names of the two cellular telephone networks in the UK?
- 13) When did 2LO go QRT?
- 14) What microwave diode sounds like a weapon?
- 15a) What have Claxby, Great Oun Fell, Clee Hill, Pease Pottage and Heathrow got in common?
- 15b) Which band do we share them with?
- 16) Which semiconducting material sounds similar to something you might find in the garden?
- 17a) What was Yagi's Christian name?
- 17b) and what was Zener's?
- 18) What would a French HF operator think FOT stands for?
- 19) An IC in your junk-box has "74ALS197" written on

- it. Here are two questions for you;
  - a) to which logic family does it belong?
  - b) what does ALS stand for?
- 20) Another IC in your junk-box turns out to be a "7912". Is it a) positive or negative? b) T0220 or 004? and c) to which of its terminals is the tab connected?
- 21a) For what is OIAC an acronym, if indeed it is?
- 21b) For what was ENIAC an acronym, if indeed it was?
- 21c) For what do the letters SCR stand?
- 21d) and what about the letters RMS?
- 21e) and finally, the letters EIRP?
- 22) In Ohm's Law and the like, we use the letter R for resistance. What letter do we use for its reciprocal, and what do we call it?
- 23) What two chemical elements would you expect to find in a GaAsFET?
- 24) Apart from striking fear into your heart, what do the letters RIS mean to you nowadays?
- 25) If you win a prize at the end of this month, you might thank ERNIE. What's his full name?
- 26) A real stinker, this - where does ERNIE live?
- 27) You find an ECH81 at the bottom of your junk-box. What function might it have served in Grandma's radio twenty years ago?
- 28) If you were taking a week's holiday on a narrowboat on the Grand Union Canal and you had a 144 MHz handheld with you, what suffix would you use after your callsign?
- 29) You're a 50 MHz addict, and last summer you heard the Gibraltar beacon for extended periods during the day. What propagation mode do you suspect might have helped you do so?
- 30) Your 50 MHz transmitter can produce 25W pep and you're using 70' of feeder with an attenuation of 4 dB per 100'. What is the highest

antenna gain you can use and still stay within the power limit on the band?

- 31a) What is the frequency of TV vision channel 46?
- 31b) Is it in Band IV or Band V?
- 32) On which frequency would you listen for GB3NHQ?
- 33) and for GB3SCX?
- 34) Should you put 1kV across an MRS25?
- 35) and what's V<sub>a</sub> max for a 4CX250B?
- 36) What's V<sub>ceo</sub> for a BFY50?
- 37) and what's the V<sub>rrm</sub> for a 1N4005?
- 38) In whole numbers, what's V<sub>f</sub> for the average red LED?
- 39) and what should the average OVM read if you connect it across the mains? (We'll make appropriate allowances for non-UK readers).
- 40) What's the postcode for RSGB HQ?
- 41) and for the DTI's base camp at Waterloo Bridge House?
- 42) and for the Radio Amateur Licensing Unit?
- 43) On which amateur band might you hear GCC?
- 44) and on which might you hear a wholly illicit Radio Tirana?
- 45) Who was for many years the President of the country of which Tirana is the capital?
- 46) and who did JY1 succeed and when?
- 47) What is Rajiv Gandhi's callsign?
- 48) and what is Senator Barry Goldwater's?
- 49) Which newsletter was most recently launched by RSGB
- 50) and who is the Editor?

Well - that ought to keep you out of mischief for a while! Answers on the back of a fiver - no, really, answers on a piece or pieces of paper to the Membership Services Department at RSGB HQ. First three correct solutions out of the barrel get the prizes and the Editor's decision is final!





## Mobile Rallies

Items are given in detail for the next three months inclusive and in brief thereafter. Please send detailed information, including contact callsign and telephone numbers direct to HQ and marked 'Bulletin'.

## 7 DECEMBER

Verulam Christmas Rally - The City Hall, St. Albans. Open 11am to 5pm. Bumper raffle, 1st prize Colour TV. Good bar & refreshment facilities. Talk-in on S22 and SU8. Details G4JKS, tel: St Albans 59318

## 14 DECEMBER

Leeds & DARS Christmas Rally - Pudsey Civic Centre, Dawsons Corner, Pudsey. Opens 11am (10.30 for disabled). Talk-in on S22. Trade enquiries G4WYD, tel: 0274 685039. Details G1EBS, tel: 0274 665355.

## 25 JANUARY 1987

Oldham Mobile Rally - Queen Elizabeth Hall, Civic Centre, West Street, Oldham. Opens 11am (10.45 for disabled). Talk-in on S22. Details G4ZEP, tel: 061-624 7354. Morse tests must be booked via RSGB HQ.

## 8 FEBRUARY

Bury RS Hamfeast - Mosses Youth & Community Centre (minutes from the M66), Cecil Street, Bury, Lancs. Details G1PKO, tel: 061-764 5018.

## 28 FEBRUARY

Rainham Radio Rally - Bredhurst R&TS, Parkwood Community Centre, Deanwood Dr, Rainham, Gillingham, Kent. (5 mins from M2 junc 4) Talk-in on S22, GB4RRR. Opens 10am. Free car park. Admission 50p. Details G1LKE, tel: Medway 362154.

IN BRIEF - More details later.

## 1 MARCH

Welsh Mobile Rally - Leisure Centre, Barry, S. Glam. Details GW8CMU, tel: 0446 711426.

## 7 MARCH

Tyneside ARS Blue Star Rally - High Gosforth Pk, Newcastle-upon-Tyne. Details G6VEG, tel: Tyneside 2866908 or G4KOT, tel: 2341148.

## 8 MARCH

Wythall RC Rally - Wythall Pk, Silver Street, Wythall. Details GOEYO, tel: 021 430 7267.

## 15 MARCH

South Essex ARS Mobile Rally - The Paddocks Community Centre, Canvey Is, Essex. Details G4FMK, tel: 0268 683805.

## DIARY

25th NARSA Amateur Radio and Electronics Exhibition - Belle Vue, Manchester. Details G6CGF, tel: 051 630 5790.

## 22 MARCH

White Rose Rally - Refectory, University of Leeds. Opens at 11am. Talk-in S22. Details GOEGM, PO Box 73, Leeds, LS1 5AR, tel: 0532 676368 (eve)

## 28/29 MARCH

RSGB NATIONAL AMATEUR RADIO CONVENTION - National Exhibition Centre, Birmingham.

## 5 APRIL

Pontefract & DARS Components Fair - Carleton Community Centre, Pontefract. Details GOAAO, tel: 0977 43101.

## 26 APRIL

RSGB VHF CONVENTION - Sandown Park Race Course, Esher, Surrey. Details VHF Committee.

## 3 MAY

BATC Rally - Crick Post House Hotel, near Rugby. Details Trevor, tel: 0532 670115.

Swansea ARS Rally - Patti Pavilion, Swansea. Details GW4HSH, tel: 0792 404422.

## 17 MAY

30th Northern Mobile Rally - Gt. Yorkshire Showground, Harrogate. Details G3CQQ, tel: 0943 602118.

## 24 MAY

Maidstone Mobile Rally - Maidstone YMCA Sports Centre, Melrose Close, Maidstone. Details G6FZD, tel: 0622 50709.

11th East Suffolk Wireless Revival - Civil Service Sports Ground, Bucklesham, near Ipswich. Details G4IFF, tel: Ipswich 688204.

## 14 JUNE

Elvaston Castle Mobile Rally - Elvaston Castle Country Pk, near Derby. Details G4PZY, tel: 0332 767994 or G4CTZ, tel: 0332 799452.

RNARS Mobile Rally - HMS Mercury near Petersfield, Hants. Details G4UJR, tel: 0703 557469.

## 12 JULY

Worcester & DARC Droitwich Mobile Rally - High School, Droitwich. Details GOAOC.

## 2 AUGUST

RSGB MOBILE RALLY - Woburn Abbey, Woburn, Bedfordshire.

Rolls-Royce ARC Mobile Rally - Rolls-Royce Sports & Social Club, Barnoldswick. Details, G4ILG, tel: 0282 812288 or 0282 813271, day.

## 6 SEPTEMBER

Preston ARS 20th Annual Rally - Lancaster University. Details G3DWQ, tel: 0772 53810.

## GB Calls

## 1 DECEMBER

GB2RSA - Royal Sigs Apprentices: Harrogate, N.Yorks. Details G4KIC.

GB4WAB - Worked All Britain: Cannock, Staffs. Details GOBXN.

GB2LBL - London Borough of Lewisham: London SE6. Details GOEGA

GB4JL & GB8JL - John Lennon: Liverpool, Merseyside. Details G4HSF & G4VKV

GB0JLM & GB4JLM - John Lennon Memorial: Liverpool, Merseyside. Details G4SYW & G4YPD.

GB1CGD - City Graduation Day: City University, London EC1. Details G1VJT.

GB1CSR - Civil Service RS: Sbrewsbury, Salop. Details GBMEN.

GB4BP - Scarborough, N.Yorks. Details G4FCH.

## 3 DECEMBER

GB4MTR - 4m: Farnham, Surrey. Details G3RSI.

GB2SJJ - Silver Jubilee Year: Droitwich Spa, Worcs. Details G4PQZ

GB0/1/2/4/6/8-GCC - Glorious Cannock Chase: Walsall & Cannock, W.Mids. Details GOEZO, G1AZQ, G4HVM, GOCWB, G4UVM & GORMA.

## 4 DECEMBER

GB2RCS - Royal Corps of Sigs: Sidcup, Kent. Details G4OHX.

## 12 DECEMBER

GB3ERD - GB + Derby & DARS Club Call: Derby. Details G4DHP.

GBONDS - Northallerton District Scouts: Northallerton, N.Yorks. Details G3MAE.

GB4SGP - South Geographical Pole: Aberdeen. Details GM4YRS.

## 19 DECEMBER

GB2MMB - Methodist Mission Bicentenary: Stourbridge, W.Mids. Details G4IEB.

## 29 DECEMBER

GB2RSA - Royal Sigs Apprentices: Harrogate, N.Yorks. Details G4KIC.

## 1 JANUARY 1987

GB8NED - GB + Club Callsign: Wisbech, Cambs. Details G8NIL.

## 4 JANUARY

GB3ERD - GB + Club Callsign: Derby. Details G4HDP.

## 10 JANUARY

GB4ORC - Oldham Radio Club: Oldham, near Manchester. Details G4ZEP.



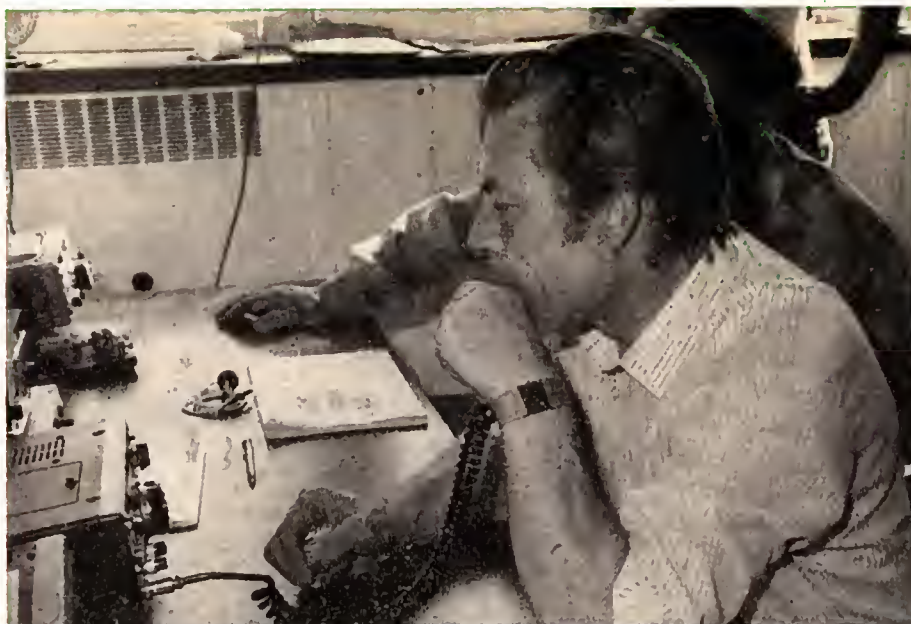
## Contests

### VHF CONTESTS 1987

1 FEB:	70 MHz Cumulative
8 FEB:	144 MHz CW
15 FEB:	70 MHz Cumulative
22 FEB:	432 MHz Fixed & AFS
1 MAR:	70 MHz Cumulative
7/8 MAR:	144/432 MHz & SWL
15 MAR:	70 MHz Cumulative
29 MAR:	70 MHz Cumulative
5 APR:	432 MHz CW
11/12 APR:	70/144 MHz & SWL
12 APR:	10 GHz Cumulative
2/3 MAY:	432 MHz - 24 GHz
10 MAY:	10 GHz Cumulative
30 MAY:	432 MHz Trophy & SWL
31 MAY:	1296 MHz Trophy
14 JUN:	432 MHz FM
21 JUN:	10 GHz Cumulative
4/5 JUL:	VHF NFD
12 JUL:	10 GHz Cumulative
8 AUG:	144 MHz Low Power & SWL
9 AUG:	432 MHz Low Power & SWL
	10 GHz Cumulative
23 AUG:	1296/2320 MHz
5/6 SEPT:	144 MHz Trophy
	IARU VHF & SWL
13 SEPT:	10 GHz Cumulative
20 SEPT:	70 MHz Trophy & SWL
3/4 OCT:	432 MHz - 24 GHz
	IARU UHF/SHF
8 OCT:	432 MHz Cumulative
16 OCT:	1.3/2.3 GHz Cumulative
24 OCT:	432 MHz Cumulative
25 OCT:	70 MHz Fixed
1 NOV:	1.3/2.3 GHz Cumulative
7/8 NOV:	144 MHz CW
9 NOV:	432 MHz Cumulative
17 NOV:	1.3/2.3 GHz Cumulative
25 NOV:	432 MHz Cumulative
3 DEC:	1.3/2.3 GHz Cumulative
6 DEC:	144 MHz Fixed & AFS
11 DEC:	432 MHz Cumulative
13 DEC:	70 MHz CW
19 DEC:	1.3/2.3 GHz Cumulative

### HF CONTESTS 1987

3/11/17/25 JAN:	7MHz Cumulatives
4/10/18/24 JAN:	3.5MHz Cumulatives
5/13/21/29 JAN:	1.8MHz Cumulatives
11 JAN:	AFS
7/8 FEB:	7MHz SSB
4-15 FEB:	1st 1.8MHz
28 FEB/1 MAR:	7MHz CW
14/15 MAR:	Commonwealth '50'
21 MAR:	Town & Country
APR (tba):	ROPOCO 1
19 APR:	QRP Fixed
17 MAY:	Region Round-up
6/7 JUN:	HF NFD CW IARU
11/12 JUN:	SWL Contest
27/28 JUN:	Summer 1.8MHz
19 JUL:	QRP Field Day
AUG (tba):	Hopscotch
30 AUG:	ROPOCO 2
5/6 SEPT:	SSB NFD
NOV (tba):	CUM 28MHz Phone
NOV (tba):	CUM 28MHz CW
11 OCT:	21/28MHz SSB
18 OCT:	21MHz CW
14/15 NOV:	2nd 1.8MHz



The photograph above (tnx G3JPJ) shows Tony King, GODDJ, Chairman of the Borehamwood and Elstree ARS, operating the special event station GB2TV. The station was located in the BBC's Elstree Studios and was run in conjunction with the BBC to celebrate 50 years of high definition television. The original callsign '2TV' was issued to John Logie Baird in 1926 and it was purely coincidental that GB2TV was available. The first contact was with Ray Herbert, G2KU, who was the last operator of '2TV'. The station was active for 36 hours and made 326 contacts. Local charities benefited by sending out private sponsorship forms based on the number of contacts made.

## CALLBOOK BOOB!

(Sorry Mrs.....)

We're sure you all think that the Autumn 1986 edition of the Callbook & Members' Handbook is the best thing since the invention of the triode, and of course it is. HOWEVER, there's a bijou blunderette on page 6 (pause while you all go and dig out your copies).... got it? Well, under the heading "Amateur Radio News Services" the first topic is Headline News, and we quote a telephone number of Potters Bar 50312. Er - not quite; nearly but not exactly what you might call spot-on.... As most readers will probably know anyway, the correct number is Potters Bar 59312 - i.e. for 0 read 9. A poor lady in Potters Bar is receiving hundreds of telephone calls at all hours of the day and night, which isn't funny and we have of course apologised profusely to her (and hung the Book Editor upside down from the antennas on the roof here at HQ). It's probably because we were working through every night for a week or more so as to get the Callbook as up-to-date as possible prior to it going on sale at Leicester, and it's one of those things - but please help us wipe the egg off our faces by using the right number, 59312 - Editors of other magazines please copy.



## BARTG NEWS

BARTG - which is the British Amateur Radio Teleprinter Group and which exists for all those interested in teleprinters, facsimile, AMTOR and packet radio - is pleased to announce that the membership subs for 1987 are to remain at £7.00. The group produces a quarterly magazine called "Datacom" which is sent free of charge to all members.

Details of how to join BARTG can be obtained from:-

John or Pat Beedie,  
Ffynnonlas,  
Salem,  
LLANDEILO,  
Dyfed, SA19 7NP.

GB2ATG - BARTG's news service - has extended its coverage in the 2m band to Merseyside. Transmissions take place on the first and third Sundays of each month at 11.30am local time from the station of G6IFX.

PS: "PS" will be back again next month.



# NEWS & VIEWS

## HF

John Allaway, G3FKM\*

### What about 10MHz?

In view of the current interest being expressed in the future of this band, no apologies are offered for re-printing the following which appeared in January 1984 issue of *QST*. It was written by WIRU, president of IARU.

"It was over four years ago that we won a slice of the 10MHz band at WARC 79, and perhaps the passage of time has dulled our recollections of how fragile that victory was.

"In 1972 a small committee participating in the US preparation for WARC 79 came to believe that a case could be made out for new amateur bands at 10, 18 and 24MHz. Those goals, among others, were shared with and adopted by the member societies of the IARU, and by the time WARC 79 commenced in Geneva a number of countries had included those bands in their pre-conference position papers. Not an overwhelming number of countries, by any means, but enough to bring the subject up for serious discussion at the conference.

"We finally got a 10MHz allocation from the conference, but only by the skin of our teeth. The chairman of the working group tackling that portion of the spectrum had to test the water with several proposals—for a 100kHz allocation, for 50kHz, for amateur primary, for amateur secondary—until he found a combination that was voted on favourably by the conference.

"It was a 50kHz segment, shared with the fixed service, with amateur use to be secondary, that was finally adopted by the conference, and then only by the narrowest of margins. Those of us who were at Geneva in 1979 held our breath as 10.1-10.15MHz made its way from the allocations working group to the full allocations committee to the final plenary session. We were all very much aware of how close defeat was on a number of occasions.

"After WARC 79, prior to actual implementation of the conference decision, there was considerable IARU debate about the projected use of that new band at 10MHz. It was indeed a special case. It was only 50kHz wide. It was shared with the fixed service, which includes both civilian and military users in many countries. Amateur use was to be secondary, and on the basis that no interference was to be caused to the primary users.

"For these reasons, should there be any voluntary restrictions by the amateur service? Yes, the members of IARU decided. Because of the limited width of the band, only narrowband modes should be used; ie cw and rty. No phone. Similarly, because the amateur service was secondary and had not to cause harmful interference to the primary user, the members of the IARU agreed that they ought not to encourage any type of operation that was competitive in nature. Thus, it was agreed not to sponsor contests on 10MHz or to encourage the crediting of contacts on that band for any form of awards. It was hoped that this restriction would discourage the wild pile-ups that often occur when a rare expedition makes its on-the-air appearance.

"Do these voluntary, mutually-agreed-on restrictions please everyone? No, of course not. There has been some pressure for ssb operation on the band, and for the crediting of dx contacts on 10MHz for DXCC. But IARU's position is still that the practical realities of our allocation on 10MHz are such that to permit phone operation and/or to permit competitive activities on that band would eventually either jeopardize our existing allocation or make it more difficult to get expanded allocations at a future conference. It is encouraging to note that so far the 120 members of the IARU have maintained the integrity of their 10MHz agreements.

"What of the future? Sometime in the next couple of years or so, more amateurs will gain access to the exclusive bands at 18 and 24MHz, and these will provide new opportunities for contests and awards. Sometime in the next decade or so, there's going to be another General World Administrative Radio Conference, and the members of the ITU will take another look at the allocations table. Surely, one of the IARU goals for that conference will be for expanded privileges at 10MHz. Maybe a wider slice, maybe an exclusive allocation, maybe both. We think we'll be in a better position to achieve these expanded privileges if in the meantime we have done nothing to violate the terms under which we now occupy the band, terms that clearly specify that we occupy it on a secondary basis, and we are not to cause interference to the primary service."

### DX news

On 10 December a number of members of the Exmouth ARC will be visiting The Gambia for a period of about one week. Activity will take place on the hf bands using the operators' own call signs /C56. It is hoped that satellite

operation will be possible subject to the reciprocal licensing conditions and the operation of existing satellites. More details may be obtained from Hugh Edwards, G4RUT, QTHR, or on Exmouth 273157. Mike Barry, G4MAB/ZD8MB, has written from Ascension Is and says that several ZD8s have been active recently—including ZD8s DP, MB and SW, and that they are happy to QSL. They especially look for UK stations on 14MHz from 1700 onwards. Mike has met Morris, F6CIU/ZD8CU, team manager for a French entry into the BOC single-handed around-the-world yacht race. The 60ft yacht had sustained damage and was skipped by its designer Titouan Lamazou who Mike was hoping to meet. QSLs for Ascension contacts should be sent to PO Box 1, Ascension Is, enclosing two irs.

According to *DX News Sheet*, HZ1AB is on the air again but this time with only an FT902 and Butternut vertical antenna. An SB220 and a beam should be available soon. 7J1ACH should continue to be on the air from Minami Torishima until June 1987—he has already made more than 11,000 QSOs and uses a TS930S also to a Butternut vertical. BY9GA is on the air from Zone 23 and is located in Lanzhou. European QSOs have been noted on 14MHz ssb around 1300.

The Uruguay DX Group hopes to visit South Shetland next February. The callsign will be CX0XY. KD7P has had to abandon plans for Peter I island operation but hopes to activate HC8, CE, KC6, H44, FK8, KH2 and other areas during his journey which began on 3 November.

QRZ DX quotes N7NG as saying that a major expedition to Revilla Gigedo, XF4, will take place in March 1987. A16V, N7NG, W6OAT, W6RGG, W6SZN, XE1ZZA, XE1IX and XE1RM are listed among the likely operators.

### Amateur activity in the Holy Land

After two consecutive years of special event stations—4X5DS (from the lowest point on earth—the Dead Sea) and 4X5J (from the walls of the Old City of Jerusalem)—the IARC through the Holon Bat-Yam Club is planning a further event to take place during the Easter season in 1987. It will be called "Easter 1987 in the Holy Land" and five special stations will be established: in Bethlehem, Jerusalem, Nazareth, Mount Tabor and the Mount of Beatitudes. The club would be happy to hear from up to 100 experienced amateurs from overseas who would be interested in participating in this unique event, and the opportunity of combining a family holiday with a chance of dxing. If there is sufficient response the club will obtain licences etc. For full information and travel details write to: Israel Amateur Radio Club, PO Box 4099, Tel-Aviv 61040. Israel.

### Awards

#### 750 Years Berlin Award

Issued by the Berlin Municipal Council and the RKDDR for two-way communication with Berlin during its 750th anniversary in 1987. All QSOs made during the year will be valid, and eligible stations will be identified by their suffixes ending in "O" or "BER". Stations with additions "A", "P", "M" and "MM" can be included when operating within the territory of the DDR capital. Double callsigns and contacts via repeaters are not valid. Each callsign may only be logged once. There are no band or mode restrictions. Total score required is 750 points, and this may be gained by working the special station Y750 (100 points), stations with the "BER" suffix (40 points), and stations with suffixes ending with "O" (20 points). Applicants from Europe (outside the DDR) multiply their points by two, and those from elsewhere by four. Listeners may apply using the same scoring system. Send log extract (signed by two licensed amateurs) plus five 1rcs to: DM Awards Bureau, DDR 1055 Berlin, Hosemannstrasse 14, German Democratic Republic.

#### Diploma Republica de Chile

The Radio Club of Chile has instituted this new award which is available to any licensed amateur who makes contact with 16 different CE stations so that the last suffix letters of their calls will form the phrase "Republica de Chile". All QSOs should be on or after 1 January 1986 and may be on any bands or modes. Send a list of QSOs (certified by an IARU member society) detailing date, callsign, band, RS/T and mode. Enclose eight 1rcs and post applications to: RCC PO Box 13630, Santiago, Chile.

### Contests

#### Happy New Year Contest

0900 to 1200 1 January 1987

CW only. 3,510-3,560, 7,010-7,040 and 14,010-14,100kHz. Organized by AGCW-DL.

#### AGCW-DL Winter Contest

1500 17 January to 1500 18 January

CW only. 1-8 to 28MHz (but not including first 10kHz). Copies of rules are available from G3FKM (sase please).

#### UBA SWL Competition

0000 1 January 1987 to 2400 December 31 1987

The object is to log as many different DXCC countries as possible on five bands (as per the DXCC list): 3-5, 7, 14, 21 and 28MHz. Each country counts one point per band and each country counts once as a multiplier. The final score is the total of countries heard on all bands added together multiplied by the number of countries heard. There are five categories: (1) single-

\*10 Knightlow Road, Birmingham B17 8QB



operator phone; (2) single-operator cw; (3) rtty, Amtor, Ascii, single-operator; (4) sstv and fax single-operator, and (5) all-mode club stations or multi-operator. Final entries have to be sent to the UBA SWL Contest Manager, Marc Dolmen, ONL 6945, Gebr. Blommestraat 14, Borcherhout, B-2200 Antwerp, Belgium, no later than 20 January 1988, but it is also necessary to submit interim scores by 1 April and 1 September. Copies of the rules are available from G3FKM (sase please).

#### World SSB Championship Contests

10m World SSB Championship  
0000 3 January to 2400 4 January  
15m World SSB Championship  
0000-2400 10 January  
20m World SSB Championship  
0000-2400 11 January  
40m World SSB Championship  
0000-2400 17 January  
75m World SSB Championship  
0000-2400 18 January  
160m World SSB Championship  
0000-2400 25 January

All organized by 73 magazine. Copies of rules available from G3FKM (sase please).

#### YL-OM Midwinter Contest

0700 to 1900 10 January (CW)

0700 to 1900 11 January (Phone)

All bands following IARU recommendations on contest-preferred segments. Copies of the rules are available from G3FKM (sase please).

Results of the 1986 ARRL DX Contests have now been published. UK scores are as follows:

#### PHONE SECTION

##### SINGLE OPERATOR

Call sign	Points
GW4BLE	654,456
G4BWP	259,782
G2OT	115,200
G4XKR	70,200
GM4WEW	13,824
G3SJK	5,124
G4GIR	3,423
G4XOM	2,898

##### MULTI-OPERATOR SINGLE-TRANSMITTER

G4ANT	237,048
G3KEP	49,500
G3HKR	22,638
G0AGH	16,263

#### CW SECTION

##### SINGLE OPERATOR

Call sign	Points	Band
G3MXJ	365,715	14MHz
GM3LYY	335,340	
GU3HFN	226,910	
G3FXB	167,076	
GW3JI	88,110	
G3ESF	69,861	7MHz
G2OT	68,493	
G3APN	62,160	
G4CNY	35,175	
G4XRX	30,504	
GM3RAO	23,868	14MHz
G6NK	12,099	

##### MULTI-OPERATOR SINGLE-TRANSMITTER

G3SJK	186,666
G3TBK	87,120

##### MULTI-OPERATOR TWO-TRANSMITTER

GB4DX	969,510
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Congratulations to G3MXJ who wins the Society's Braaten Trophy for being leading G in the CW Section, and to GM3LYY who wins the Milne Trophy as top UK station other than G in the same section.



G3UD (SO9UD) on left, with Stan, SP9YP, in his shack while on a visit to Krakow

## ALL TIME BAND TABLE—CURRENT COUNTRIES No5

	1-8MHz	3-5MHz	7MHz	14MHz	21MHz	28MHz	Total
G3KMA	124	230	293	316	314	300	1,577
G3GIO	69	203	252	312	312	294	1,442
G4DYO	63	176	225	308	300	283	1,355
G3XTT	134	190	229	281	274	244	1,352
G3UML	30	212	225	314	284	243	1,308
G4FAM	64	180	238	268	265	240	1,255
G3ALI	2	213	221	302	271	231	1,240
G2DMR	52	164	173	299	291	257	1,236
G4GIR	67	169	206	270	250	244	1,206
G3XOU	44	161	184	287	270	242	1,188
G4BWP	65	182	204	263	214	237	1,165
GW4BLE	24	166	180	271	268	240	1,149
G3VIE	43	117	169	285	284	246	1,144
G3TXF	59	161	180	252	245	205	1,102
G3IGW	99	150	234	225	197	182	1,087
G3NOF	4	84	82	312	308	264	1,054
G3YMC	75	102	166	236	239	184	1,002
GW4OFO	50	200	182	210	191	135	968
GM3YOR	68	131	175	209	193	179	955
G4OBK	115	103	127	190	161	124	820
G4JBR	60	134	120	140	153	158	765
Average	62	163	194	264	252	225	1,160

Next deadline: All-Time (with deletions) scores to reach G3GIO by 15 January please. Band leaders are listed in bold letters.

## 1986 28MHz COUNTRIES TABLE

G3VOF-115	G4RAB-74 (ssb)	G3BXM-31 (QRP)
G4JBR-111	G4MUW-74 (ssb)	GD3SUWIA-27 (cw)
G3XOU-105	G0DNV-71	G4YWG-17
G0AEV-100	G4OBK-60	G4XNG/M-16
G4XAH-96	G0DXW-44	G4LZZ-5
G0AGP-76	GM4CHX-33	5B4DN-2

## Band reports

The latest contribution from G8KG confirms the many comments received concerning the excellent conditions during the weekend of the CQWDX Contest (Phone). It reads as follows: "The last week of October provided an excellent example of how conditions on the hf bands can change for the better in a very short time. During both August and September solar activity had been generally low with the 27-day average solar flux slowly sinking to 68sfu and only one day with a value above 70. To make matters worse, the geomagnetic field was disturbed for much of September with only nine days having an A-index below 10.

"The full data for October was not available at the time of writing, but by the middle of the month it was evident that hf conditions were showing a marked improvement over and above the seasonal improvement to be expected at that time. On the eve of the CQWW Phone Contest, WWV was reporting the solar flux at 98sfu with an estimated A-index of only 2. Over the next few days conditions on all bands up to 21MHz were outstanding for this stage of the cycle, and 28MHz openings included SE Asia, Australia, Africa and N America. It remains to be seen how long this improvement will last.

"The September bulletin from SIDC Brussels forecasts that the cycle minimum will probably occur during the period October 1986 to April 1987, but this prediction could be affected by the high out-turn in October and, as previously reported, there are some rather tenuous pointers to a minimum date early in 1988."

The improved conditions have caused a very welcome increased input to this section and I would like to thank the following for their help: G2HKU, G3YY, G5JL, GM3CSM, G3s GVV, KSH, PJT, PXT/M.YRM, G4s EHQ, JBR, GW4KGR, G4s LRS, MUW, OBK, RFE, GW4UKU, G4s UOL, UZN, XAX, XNG/M, G0s AEV, AGP, and RSs 10906, 25429, and 88639.

As usual, stations printed in italics were using AIA.

1-8MHz 0000 TA2BK, VP2MU, 4U1VIC, 0200 PJ2FR, 0300 SV1JG/SV9, VP2EC, 0400 VE8DX, 0500 OA4ZV, W1.2.3, 0600 CT4AT, EAs 8XC, 9EU, HH7PV, VP2MU, W0, ZI2BT, 1900 OH0BH, 2200 HG7B, LA7Q, UF6FWY, N4SF/VP9.

3-5MHz 0200 FM5BH, UZ9OWB/UD, 0400 VP2VA, W1-W4,9,0, 0500 NP4A, 0600 CU2CR, KL7NT, W6, YS1ZY, ZL, 0700 OA4BSJ, VK9NS, 1900 JR8AHO, 2000 JA, UA0QA, W1, 2100 JA, OX3KM, 2200 OH0AC, OY6FRA, PA6VHS, UL7BM.

7MHz 0200 VP2EK, 0500 W6, 0600 VK2.3, VR6YL, ZL2.3, 0700 HD8G, JA, LG5LG, PZ2AC, T11C, VK9NS, YN3EO, WL7E, 1500 JA, UA0TO, K4YT14D9, 1800 VU2TEC, 1900 JA6YKC, JA0JHA, JY8XX, 2000 C31LDL, YC6LD, VK2EKY, 2100 TR8JJC, 2200 UL7OAZ, VE2ACP, ZS6DF, 2300 VP2s, 9M2AX.

10MHz 0500 ZL3AAH, 0600 UA9MD, UF6DA, VK2.3,4,5, DL1JW/VP5, 0700 JR0VRU, VK6.7, 0900 K4SYU, VK6AKG, UA9, UA0, 1200 JA1CXL, UZ9SWA, 1300 JA5BEN, 1400 JA11FP, RW0AM, UL7DD, VK3YD, 1500 JA, UL7OAF, UM8MK, 1600 YCFRX, 7X2AX, 9M2FS, 1700 UM8MIR, ZS6s FH2USH, 1800 HB9CMX/EA6, RA4HTIUM, ZL1HY, 1900 NOBB, VE1, ZL3GQ, 2000 FG5s AM, XC, W7BNX/0, 2100 HK7LRB, JR0VRU, YN3EO, 2200 CU3AA, OA4ZV, ZS1VP, 2300 VQ9GB.



## QTH CORNER

AZ1D	RC Mar del Plata, Alta Brown 4255, 7600 Mar del Plata, BA, Argentina.
C30LDZ	DJ1RL T See, Breutg 13, D-6457 Maintal, FR Germany.
J49A	SV1IW PO Box 23051, GR-11210, Athens, Greece.
JY7Z	A Turriti, K6VNX, 8819 E Callita St, San Gabriel, Ca, 91775, USA.
P366P	A Hubert, N2AU, 436 N Geneva St, Ithaca, NY, 14850, USA.
PY1DFF/PY0T PY2RRG/PY0T	C Pinto, Box 90981, 25600 Petropolis, RJ, Brazil.
SV5OX	PO Box 157, Rhodes, Greece.
V31CV	J L Poli, NA5S, 9206 Canter Dr, Dallas, Tex, 75231, USA.
VP2VA	M Wolfson, VE3MJ, 305 Rosemary Rd, Toronto, Ont, M5P 3E4, Canada.
YN3EO	W Fasset, Spartakusring 14, DDR-1200 Frankfurt am Oder, DDR.
YW1A	YV1TH, Calle los Datiles 218-A, Campo Miraflores, Cebimas, Zulia, Venezuela.
ZL8HV ZL9AA	P Fisher, Raoul Is, Overseas Mail Branch, CPO Auckland, New Zealand.
9L1ZIM	F Caddedu, DJ0GN, Rundstr. 34, D-3503 Lohfelden 1, FR Germany.
9V1SC	Singapore Science Centre, Science Centre Rd, Singapore 2260.

V31CV. 1800 KL7BL, W6-W7, ZS3MS, 9L1ZIM, 9X5MH. 1900 AL7CQ, S79WHW, T11AH, ZL1AV, 2000 DP0GVN, FRW6QL, TRF8GAL, VP8MT. 2100 HD8GRC, W6RQ, ZF2FL. 2200 VP8PTG, 4U1UN.

18MHz 0900 EA1BSW. 1000 ISOLYN, OE5NT.

21MHz 0700 HS0A, VQ9GB. 0800 A22BW, BY4AA, P29NWJ, TA3D, 4S7AVR, 5H3ZO 9N1MC. 0900 HL9CW, VK6IR, VK9XI, ZB2EO, 3B8GQ. 1000 DP0GVN, FY5YE, P29VU, TU2QU, V22A, VS6DF, 1100 BV2DA, DU9OAN, J70DWT, JY5E, VK8NG, VK9XI, VP2EC, VS6UO, YC0BLO. 1200 VP5IL, VU2BK, W1-W4, 8.9. 1300 HS4AN, P36P, TA1P, VP2MW, W3MA/VP9. 1400 W3JT/HK0, J49A(=SV9), VP2VA. 1500 HH2SB, VQ9GB, W6-W7. 1600 AZ1D, HD8G, W7, VP5DE, VP8FIR, VS6VF, ZD7CW, 9M2MA. 1700 C53FP, F45BC, P40A, VQ9GB, ZD9BV. 1800 HK, HP, PY2RRG/PY0T, VP8, ZP, 8R1Z. 1900 FM4CP, W6, 5H3DX. 2000 CE, HK, LU, PJ, PY, T11C, V31CV, 4C2C. 2100 CO, H10JR, VP2EC.

24MHz 1100 CT4AH. 1400 W1-W4, 5.8 (to 1700).

28MHz 0800 HL4AB, VS6PWI. 0900 HS0A, OD5RF, P36P, VK6NPH, VU, YE0X, ZS6PW. 1000 A92EP, FRW6QL, SV1JG/SV9, TA2BK, VK3CBP, VK6HD, VQ9GB, 3B8MS. 1100 HB0LL, J49A, VU, Z21. 1200 OA4BCZ, YC1EHR, F6HCL/5N26, 9K2DZ. 1300 HZ1HZ, Y11BGD, ZD7BJ, F6BZA/7X. 1400 FR4DN, W1, W4, 5T5CJ. 1500 A22BW, DP0GVN, K2ARQ, N5AU, 3D6BW. 1600 CX8AC, VP8B, BHQ, FIR, ZF2FL, 5H3RB, 8P6OV. 1700 CE2BJ, FY5FE, LU, PY, VP8JC, ZP5CVI, 3D6EA. 1800 D44BC, LU, VP8QP, 5N26MBT. 1900 CT3BM.

Thus comes to an end another year, and I would like to wish all readers a very happy Christmas and New Year accompanied by my thanks for support during 1986. I would also like to thank the authors of the following for information obtained from their publications: *Long Skip* (VE3IPR), *Lynx DX Group Bulletin* (EA2JGO), the *DX Family Newsletter* (JHIKRC), *DXpress* (PA3CXC), *CQ Magazine* (W1WY), *DXNL* (DL3RK), *Long Island DX Bulletin* (W2IYX), *DX News Sheet* (G4DYO) and *The Ex-G Radio Club Bulletin* (G13OEN/W6).

Closing date for receipt of material for February issue is 11 December. Please allow extra time for the holiday period. □

## HF F-layer propagation predictions for December 1986

The time is presented vertically at two-hour intervals 00(00)gmt to 22(00)gmt for each band, ie 0=0000, 1=0200, 2=0400 etc.

The probability of signals being heard is given on a 0 (indicated by a dot) to a 9 scale; the higher the number the greater the probability, with 1 meaning 10 to 19 per cent of days, and so on. Additionally 50MHz F-layer and 1-8MHz openings are indicated by a plus (+) sign in the 28 and 3-5MHz columns respectively.

Time / GMT	28MHz 000001111122 024680246802	24MHz 000001111122 024680246802	21MHz 000001111122 024680246802	18MHz 000001111122 024680246802	14MHz 000001111122 024680246802	10MHz 000001111122 024680246802	7MHz 000001111122 024680246802	3-5MHz 000001111122 024680246802
•• EUROPE								
MOSCOW	.....	.....22.....	.....2351.....	.....4774.....	.....98981.....	32.476676..1	885644457568	++532..24+++
MALTA	.....	.....211.....	.....3544.....	.....57771.....	.....89884.....	45357678222	998743347788	+++4...4+++
•• BALTIC	.....	.....	.....235.....	.....15652.....	.....58884.....	13218668821	898764346777	+++3...3+++
•• ABIA	.....	.....	.....11.....	.....143.....	.....5873.....	.....477781.....	552.75537743	+++42224+++
•• ABAKA	.....	.....	.....	.....	.....4.....	.....6212.....	1.142124133	.....25+2
HONGKONG	.....	.....	.....21.....	.....43.....	.....662.....	.....144421.....	1.12124254	.....25+4
BANGKOK	.....	.....13.....	.....461.....	.....573.....	.....1576.....	2.24433.....	3.11253365	.....25+5
SINGAPORE	.....	.....232.....	.....4651.....	.....5773.....	.....14666.....	2.14453.1	2.1125465	.....25+3
NEW DELHI	.....	.....22.....	.....553.....	.....675.....	.....25662.....	41.123441.13	731.1124468	5.....25+4
TEHRAN	.....	.....332.....	.....5652.....	.....17774.....	.....45567.....	542322454.13	8841.125578	+.....25+4
COLOMBO	.....	.....332.....	.....5662.....	.....15775.....	.....235671.....	12.2455.13	52.1125578	3.....25+4
BAHRAIN	.....	.....322.....	.....5552.....	.....16674.....	.....1.44667.....	632311354124	973.1125678	+5.....25+4
CYPRUS	.....	.....2221.....	.....4543.....	.....7776.....	.....288881.....	22.676786.....	987311236899	++4.....3+4
ADEN	.....	.....3332.....	.....5555.....	.....15567.....	1.423574.....	7.22.257244	942.1125788	+4.....25+4
•• OCEANIA								
SUVA/B	.....	.....	.....	.....1.....	.....14452.....	.....	.....321251.....	.....2.....
SUVA/L	.....	.....21.....	.....542.....	.....7642.....	11.8665431.....	236434652.....	2311142.....	.....2.....
WELLINGTON/B	.....	.....	.....1451.....	.....11.....	.....1451.....	.....4444.....	42124.....	.....2.....
WELLINGTON/L	.....	.....	.....1.....	.....421.....	11.7532231.....	2164346421.....	1311141.....	.....2.....
SYDNEY/B	.....	.....21.....	.....353.....	.....5761.....	.....7765.....	.....154452.....	2212521.....	.....23.....
SYDNEY/L	.....	.....	.....2.....	.....52.....	365314.....	5434572.....	2212441.....	.....2.....
PERTH	.....	.....332.....	.....5662.....	.....16875.....	247671.....	1.14455.12	1125562.....	.....254.....
HONOLULU	.....	.....	.....	.....	.....2142.....	.....2142.....	1.221242.....	.....242.....25.....
•• AFRICA								
SEYCHELLES	.....	.....1332.....	.....3565.....	.....14577.....	.....222574.....	4.1.257244	811.25788	+.....25+4
MAURITIUS	.....	.....3332.....	.....5566.....	.....15671.....	11.222575.....	741.257345	73.25789	4.....24+4
NAIROBI	.....	.....4333.....	.....5566.....	.....15672.....	2.322367.....	8122.37455	963.14788	+4.....24+4
HARARE	.....	.....2344.....	.....45672.....	.....55575.....	22.232357111	8722.26666	973.3789	+4.....4+4
CAPETOWN	.....	.....133.....	.....25674.....	.....45576.....	21.132346211	8622.14677	973.1489	+4.....5+4
LABOB	.....	.....13331.....	.....56675.....	.....76567.....	24.153236322	89242.13788	8873.1588	5+5.....2+4
ASCENSION Is	.....	.....3321.....	.....5543.....	.....56556.....	243.64234322	898241.1478	98851.269	+++2.....3+4
DAKAR	.....	.....2321.....	.....5543.....	.....47557.....	133.75325311	789252.2577	88972.279	+5+4.....4+4
LAS PALMAS	.....	.....222.....	.....4442.....	.....27775.....	122.87667311	788575445776	999852112589	+++2.....2+4
•• S. AMERICA								
StH BHETLAND	.....	.....1233.....	.....14456.....	.....46666.....	133.66544211	466253211123	234321.....1	.....442.....
FALKLAND Is	.....	.....21.....	.....14465.....	.....26555.....	123.664321.....	5782631.123	467531.....1	.....442.....
R DE JANEIRO	.....	.....21.....	.....5323.....	.....6444.....	123.36322211	7893631.135	989741.....15	+++5.....2
BUENOS AIRES	.....	.....1112.....	.....4324.....	.....16545.....	113.564221.....	5783641.13	689741.....2	3+5.....
LIMA	.....	.....231.....	.....554.....	.....764.....	.....6431.....	2361.231.....1	5896221.....1	2+5.....
BOGOTA	.....	.....221.....	.....553.....	.....764.....	.....116421.....	22415341.11	6786421.....2	4+5.....
•• N. AMERICA								
BARBADOS	.....	.....231.....	.....554.....	.....2754.....	.....56322.....	3251343.122	8776421.....15	+++5.....2
JAMAICA	.....	.....21.....	.....253.....	.....564.....	.....6531.....	112.3342.1	6674421.....2	5+5.....
BERMUDA	.....	.....21.....	.....253.....	.....565.....	.....26545.....	1.2.24421221	7574421.....25	+++2.....3
NEW YORK	.....	.....	.....43.....	.....265.....	.....5653.....	.....1244332.....	64624211.123	+++2.....2
MEXICO	.....	.....	.....42.....	.....74.....	.....1741.....	.....22341.....	35624212.....1	+++52.....
MONTREAL	.....	.....	.....42.....	.....265.....	.....5763.....	.....1244332.....	646232121124	+++2.....3
DENVER	.....	.....	.....1.....	.....13.....	.....462.....	.....34121.....	354.31121.11	2+52.....
LOS ANGELES	.....	.....	.....1.....	.....3.....	.....161.....	.....1.3421.....	244.32121.....	4+52.....
VANCOUVER	.....	.....	.....	.....21.....	.....11531.....	.....242.31123211	242.31123211	4+52.....
FAIRBANKS	.....	.....	.....	.....	.....11132.....	.....231.22125421	231.22125421	344.....22.....

The provisional mean sunspot numbers for September 1986, issued by the Sunspot Index Data Centre, Brussels, was 3-9. The maximum daily sunspot number was 13 on 7 September, and the minimum was 0 on 12-28 September. The predicted smoothed sunspot numbers for December, 1986, and January, February, March, 1987, are respectively: (classical method), 4, 3, 2 and 1; (SIDC adjusted values) 4, 3, 2 and 1.

# VHF/UHF

Ken Willis, G8VR\*

## Repeater news

Martin Hall, G0BQK, who is Swindon area publicity representative for the Vale of the White Horse Repeater Group, says that their vhf repeater, GB3WH is having problems. It shares a site with several—and ever-increasing numbers—of pinr systems, and recent tests have disclosed that severe interference to ongoing QSOs is being caused by intermodulation products from these transmissions which produce a signal on the input frequency of the repeater. Since the signal is within the passband of the receiver, the group is doing everything possible to overcome the problem, and they pass on apologies to those who are having contacts interrupted by excessive bursts of noise. No doubt the group would appreciate input from any other repeater groups which might have encountered similar situations.

Writing from Singapore, Graham Smith, 9V1WL (GM3SNO), says that at long last Singapore has its first amateur radio repeater. It is on 144MHz (R1 145.625MHz transmit 145.025MHz receive) with callsign 9V1RS. It is centrally located at the British Club, which is about 250ft asl giving very good coverage throughout the island, plus parts of Malaysia (Johore) and some areas in Indonesia. It currently has only carrier-access and a 2min time-out.

The autumn edition of *Central Scotland & Borders FM News* contains its usual wealth of information, both technical and operational, including an up-to-date listing of UK 144MHz repeaters and an interesting computer-generated map illustrating vhf repeater coverage in the UK.

Leicestershire Repeater Group's Newsletter *LENS* No 3 1986, is to hand and contains information and a photograph of the new atv repeater built for the group by John, G3YQC. The custom-designed receiver system is based on the Astec two tuner and fm-tv demodulator modules. The transmitter was evolved from the Comex system, as was the 6W amplifier. An internally-generated b/w test card is incorporated which includes callsign and location information. A constant audio tone is transmitted, interrupted every 2min by callsign in cv plus locator identification. This repeater, GB3GV, was installed on 9 August and appears to be working very well. The group also operates the rtty repeater GB3RY, and has a proposed 10GHz video repeater on the stocks; a very diversified group indeed! For more information and membership details, the secretary is Eileen, G4SBY, and membership secretary Stefan, G4MGG, both QTHR.

## Reciprocal licensing

Andy McClelland, G0DKN/PA, writing from Holland, says that anyone hearing or contacting a station with callsign NL/own-call, should not get excited and think it is Alaska! The Dutch Post Office has decreed that amateurs visiting Holland and operating under CEPT reciprocal arrangements must prefix their calls with the international car registration letters for the country (NL) and not use the amateur prefixes PA, PB, PE etc. As a long-term resident, Andy has been permitted to keep his "own call/PA".

Graham Smith, 9V1WL, comments that reciprocal licences are not yet available in Singapore, but visiting amateurs can apply in advance to Telecoms for permission to use a local amateur's equipment, which could be, for instance, at the newly-licensed Science Centre station, 9V1SC. At present only spot frequencies are available for use by Singapore amateurs on 144MHz, and similarly for 432MHz though nobody seems to use the higher band in that country. The Singapore Amateur Radio Transmitting Society (SARTS) is working hard to get better licensing conditions for local amateurs.

Michel Monteil, F/G6WDK (Montpellier) provided some very interesting information on the vhf/uhf scene in north Africa. He was surprised to learn through this column that 3V8 had been worked on 144MHz. He suggests it was 3V8PS, who is the only station licensed there at present. Amateur radio is forbidden in Tunisia except for nationals, few of whom appear to be very interested in the hobby. In the past, Michel has twice applied for a 3V8 reciprocal licence without success. In Morocco (CN8) operation appears to be allowed on 144MHz and on 432MHz and 1.3GHz, but very few stations are thought to be active. Occasionally, says Michel, and mostly during the sporadic-E season, a single CN8 is heard or worked. In Algeria (7X) operation on 144MHz, as well as from mobile stations, is forbidden. Here again Michel, the inveterate activator of rare dx spots on

vhf, was turned down when he applied for a licence. It seems, however, that no set rules exist in Algeria for the higher bands, which is why a few amateurs who applied for permits to operate on 432MHz received licences for the band. Equipment and components for 432MHz operation are hard to come by in Algeria. Only transceivers imported through the national society are allowed into the country, which is why all local clubs (and pirates!) use the same equipment. Most of Michel's information on Algeria came from a trip there at the end of 1984, when he visited the official Algerian Radio Society station 7X2ARA, and talked to local amateurs including 7X2SX, president of the national society.

To learn of some of the regulations confronting amateurs in various parts of the world, makes one more appreciative of our own licensing authority's attitude to these matters, despite the fact that we all like to grumble from time to time.

## 70MHz

Following the extension of 50MHz facilities to all Class A licensees, operation on 70MHz has appeared to wane somewhat. The old adage, "Use it or lose it" must still apply, so it is fortunate that there is a dedicated group of operators who are prepared to put up with the long periods when nothing is heard on the band and who continue to monitor and work it. One of these is John, GW3MHW (Powys), who also activates a second QTH on the band when he goes to Dyfed, where his old-time transmitter uses a pair of 35Ts in the final (with a couple of HK24Gs in the drawer as spares!). If that sentence fails to raise a prickle down your spine, you were no doubt born after the second world war!

In the August *VHF/UHF*, Dave Rycroft, ZC4DR, queried whether Cyprus had ever been worked on 70MHz, except possibly by someone operating as a pirate. This arose from a statement by G4FRE that only 10 countries were available to be worked on the band. G4FRE says that 5B4AZ is apparently very much alive since he is listed as the local *Dubus* distributor, and being in Limassol is presumably the 5B4CY beacon keeper. Dave, G4FRE, says that the point still remains, that only three stations have worked Cyprus on 70MHz over the past six years, so to set a level of 10 countries for awards on the band tends to discourage its use. He quotes the fact that many stations gaining squares awards have exceeded the number of squares demanded for both 144 and 432MHz certificates, whereas none have managed this on 70MHz, a further indication that we need to do something to promote greater activity and interest in the band.

G4FRE refers back to 4-2-70 for August 1981, when John Morris reported a sporadic-E event. It coincided with the RSGB 70MHz Contest, when G4PBY and GW4ASR/P both worked 5B4AZ by (assumed) double-hop Es, for G-5B4 and GW-5B4 "firsts", the latter over a distance of 3,475km. Furthermore, 5B4AZ was reported to have used 10W to a dipole, plus "the beacon transmitter supplied by G4BPY". That certainly does not appear to be pirate operation, so we look forward to the next round in this discussion.

Last month the Square Bashers expedition to ZR and YS squares was reported. What I did not know until I met them at the Midlands VHF Convention was that they also made a side-trip for a few hours into XS square to activate 70MHz. Some of the team became bored operating from the comfort of a cottage, so after an initial sortie by GW3NYY and GW8TVX to find a suitable site in XS, G8TFI and G4FRE set up stations on 144 and 70MHz, operating from cars, during the evening of 13 August. Equipment on 70MHz was an IC202S, MM transverter, 4CX250 running 100W and a five-element Yagi at 9m height, call being GM4FRE/P. No skeds were arranged, stations being told "QRV 70.185MHz, 1min ssb periods, GM4FRE/P transmitting second period". Six stations were worked on meteor scatter (G4ASR and G4SEU both in a single 25s burst), plus five more on tropo. Best dx was 756km on ms (G3UAX) and 626 on tropo (G4AFJ). On 144MHz the group worked GW4TEE in YN, regarded by the locals as an impossible feat. Incidentally, the Square Bashers have had special QSL cards printed for the full expedition, and they planned to send them out by early November. So don't forget 70MHz or someone will think we don't need it any more.

## Meteor scatter

Some time ago mention was made of some comments by John Matthews, G3WZT, on various meteor scatter procedures. John is as well qualified as anyone to make a contribution to this subject, but until now space has precluded further amplification of the points which he raised. First of all, he points out in response to some critics that the change to 144.400MHz for random ssb working was agreed at the Brighton IARU Region 1 Conference in 1981, and was intended for a three-year trial period. It was in line with other new proposals for random working, for example listening on a frequency determined by the last letter in the callsign of the station calling CQ. It also took account of the fact that if the same procedures were used

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on ew, the cw random frequencies would extend from 144·100 to 144·126MHz, getting ever-closer to the existing 144·200 ssb random frequency. In the event, as vhf manager G3WSN pointed out at the Midlands VHF Convention, the adoption of 144·400MHz never really took off in the manner intended, though it is used by some as a second random frequency during major showers.

G3WZT goes on to comment on the conveyance of information other than calls and reports via ms, particularly "missing" or defective keying information. John says that anything which works could be used, provided it is both well-defined and published in such a way that it is known and understood by all ms operators. For example, either QCM (your keying is defective) or ZCK (check your keying) would be quite acceptable, used instead of calls and report. He also quotes a situation all ms operators meet from time to time. Some European stations will only send a report when they have copied both calls. To illustrate the problems which can result from this, John mentions a recent sked with a CT4, when he was sending calls plus 27, the CT4 only call signs. He then received a long burst containing only "Rogers", a situation which can then be retrieved only by the use of a standardized missing information procedure, or not at all.

This month the Geminids shower should peak sometime between 13 and 14 December. See last month's *VHF/UHF* for a print-out giving optimum times for reflections along given paths, though these figures are based on the geometry, not the number of meteors which may be present at the time. A similar print-out for the Quadrantids (January 1987) is shown in this issue.

QUADRANTIDS			MAX. 3/4 JANUARY ZHR 100		RADIANT AT RA 230. DEC 48		
HRS	AZ	EL	N/S	NE/SW	E/W	SE/NW	
00	35	19	XXXX	X	XXXXX	XXXXXX	
01	43	25	XXXXX		XXXXX	XXXXXXX	
02	52	32	XXXXXXX	X	XXXXX	XXXXXXXX	
03	60	40	XXXXXXXX	XX	XXXXX	XXXXXXXXXX	
04	67	48	XXXXXXXXX	XXXX	XXXXX	XXXXXXXXXX	
05	75	57	XXXXXXXXXX	XXXXX	XX	XXXXXXXXXX	
06	83	66	XXXXXXXXX	XXXXX	X	XXXXXX	
07	95	76	XXXXX	XXXX		XXX	
08	126	85	X	XX	X		
09	244	94	XX	X	X	XX	
10	267	74	XXXXX	XXXX		XXXX	
11	278	65	XXXXXXXXX	XXXXX	X	XXXXX	
12	286	56	XXXXXXXXXX	XXXXXXXXX	XXX	XXXX	
13	294	47	XXXXXXXXXX	XXXXXXXXXX	XXXX	XXXX	
14	302	39	XXXXXXXXXX	XXXXXXXXXX	XXXXX	XX	
15	310	31	XXXXXXXXX	XXXXXXXXXX	XXXXXX	X	
16	318	24	XXXXX	XXXXXXXXX	XXXXXX		
17	327	18	XXX	XXXXXX	XXXXX	X	
18	336	14	XX	XXXX	XXXX	XX	
19	346	11	X	XXX	XXXX	XX	
20	356	9		XX	XX	XX	
21	6	10		XX	XX	XXX	
22	16	11	X	XX	XXXX	XXX	
23	26	15	XX	XX	XXXX	XXXXX	
24	35	20	XXXX	X	XXXXX	XXXXXX	

Probability of reflections along given paths for Quadrantids shower. Computer program courtesy of *Dubus* and *G4IJE*

Also mentioned last month was the suggestion that 50MHz operators try to be active during the period 11 to 15 December on 50·350 ssb for random ms contacts. Since people cannot stay up all night, times suggested as most likely to produce results are 0600 to 0700 and 2200 to 2300gmt daily during the period stated.

During October the Orionids shower was due, and it was believed that this year it would be an outstanding one. G4IJE made a point of monitoring during the predicted times, but found no activity higher than he would expect from sporadic meteors. The Orionids, of course, are produced from the tail of comet Halley which made all the news this year. On the "way up" the comet tail intercepts the earth's orbit to produce the Eta-Aquarids, and on the descending node gives rise to the Orionids.

G4IJE also reports having received quite long bursts from 50MHz beacon ZB2VHF, sufficient to copy the new message which it is transmitting. Have you heard it yet? GW3MHW has, on several occasions.

## 50MHz

The big news on this band is that according to LA6QBA (and hopefully confirmed by the time this appears in print), Norwegian amateurs are to be granted facilities for 50MHz operation as from 1 January 1987. Apart from two areas, one in the south, the other in the north, where tv interference is likely to be a problem, 24h operation will be permitted, with (probably) 25W transmitter power. At the moment there are some 30 permit holders in LA, so this extension of facilities, following on developments in the UK, must surely indicate that the efforts of the RSGB and the readiness of the licensing authority here to adopt an innovative approach have borne fruit. If other national organizations follow suit, and eventually we get facilities for both classes of licensee on this band, there is no doubt that its popularity will increase still more.

John, GW3MHW, reports that several stations have been reporting reception of 50MHz beacon ZB2VHF, his log covering days up to 25 October; another indication of the sporadic-E potential of this band, if indeed this is the mode by which it is being received. I say that because in the October issue I commented on the reception of beacon FY7THF by (among others) G4GLT, and went on to say that he and G2AHU believed the propagation to be "Es at our end of the path, and F2 thereafter". Ray, G2AHU, hastens to correct me by saying that anything said about what he "believes regarding propagation is a hcrsy . . . we simply do not know". With 28MHz being used as a crossband medium for 50MHz operators, more people are monitoring the band, and on 26 October, Paul, G4IJE, found the band open to 3V8, VP8, ZS, LU etc, and—perhaps more unusually for this low-point in the solar cycle—to the USA and Newfoundland. GW3MHW has been listening for African beacons on 50MHz without success so far, but the RSGB solar information put out over GB2RS on 26 October indicated a welcome rise in solar flux with the highest reading since June 1983 being recorded on 17 October, so we may have "bottomed out" in the current solar cycle and some autumnal F2 propagation may not be entirely out of the question.

Other snippets of news for operators on this band are: Friday nights are activity nights on 50MHz, between 7pm and midnight, it being suggested that operators call "CQ" on or near the hour (as well as at other times we hope!); GD4FOC is erecting a 50MHz beam; GD4GNH was QRV using gear borrowed from GD3HQR; G14GPC receives beacon GB3NHQ almost every day, so point your beams towards G1 more often; EI4CL is also QRV on the band, worked by GW3MHW, and has a three-element antenna. When conditions are up, your "CQ" may be answered by YU50MHZ which puts you in a spot of bother since we must not, under the terms of our licences, communicate with an unauthorized station. At least one station was put in this awkward position on 9 October when Es conditions to Europe were very good and many European tv carriers were heard on and around the band.

John, G4BAO (Cambridge), would like some regular skeds on 50MHz with someone able to work packet radio with the intention of trying to exchange packets during a single ms burst, so stations in GM or G1 would be favourably placed for such tests. Contact him QTHR.

## Tropo

As we went to press for the November issue, some excellent tropo conditions were reported for the end of September, much appreciated after a long period of poor propagation. The weather continued to produce good tropo into October, with some very good contacts being made, including some between Italy and the UK during the week commencing 5 October. There were also many QSOs between OK, SP and the UK. Never far from the action, G6ECM (Herne Bay) worked 16 OKs, some SPs and HB9s between 3 and 9 October, which is an indication of the length of stable conditions resulting from a high-pressure area over Europe.

During the same period, GW4RWR had some interesting experiences. On 30 September, he was driving home from Cardiff and heard much dx on Band 2 fm, so he set off for his portable site and worked some OKs. His total score was five OKs, two SPs, OE, DL and Y22. Then came the crunch; after such intense operating, the car battery was flat and the vehicle had to be pulled across open ground to a slope in order to get started again, and all this at 3.30am!

## Midlands VHF Convention

This convention on 11 October at Madeley Court Centre, Telford, Shrops, proved very successful. It tends to attract the weak-signal vhf types, but the lecture programme this year catered for a wide variety of tastes. The vhf forum, held at the end of the day's formal proceedings, was a very lively affair with nearly two hours of questions being hurled at the panel, the topics under discussion covering almost every aspect of the hobby. We need this event to grow, especially as the venue of the main RSGB vhf convention is firmly placed in the south. Next year we must see that publicity is better handled, since many members received their *Radio Communication* (with its advertisement of the convention) after the event itself. Anyone with views on conventions and similar activities should make them known to the VHF Committee (chairman, G3ZNU) since the committee wants to provide the best possible service to the majority of vhf/uhf operators and so needs to know what *you* want.

## Solar data

As mentioned last month, some readers find the solar information broadcast by GB2RS news service to be too technical, so in this and later issues I will deal briefly with some of the terms used and their significance. **F2 critical frequencies.** These are generally stated at this point of the solar cycle as being around 5 or 6MHz, and would therefore appear to be of little

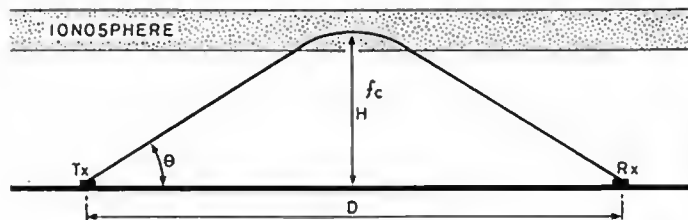


Fig 1. An example of a low-angle radiation path.  $H = 200$  miles,  $D = 1,000$  miles,  $f_c = 5\text{MHz}$ ,  $muf = 13.3\text{MHz}$  for radiation angle  $\theta$  of  $25^\circ$ .  
 $MUF = f_c \sqrt{\frac{D^2}{4H^2} + 1}$

interest to vhf operators. What we would like to see is a situation when the ionosphere was sufficiently "highly charged" to reflect radio waves at frequencies in the vhf part of the spectrum. This seldom occurs at frequencies higher than  $50\text{MHz}$ , and then only during times of high solar activity (11-year peak of solar cycle) when transatlantic and much greater dx can be worked on the  $50\text{MHz}$  band. When this is possible, we say that the maximum usable frequency (muf) has reached or exceeded  $50\text{MHz}$ , and we cannot really hope for this until the late 'eighties or early 'nineties since we are now at the low-point of the cycle.

On a regular basis, observatories beam signals vertically to the ionosphere, and vary the frequency until the upper limit is reached. These are the critical frequencies, and in the GB2RS transmission for 26 October, for example, the critical frequency measured at the Appleton Laboratory was  $7.4\text{MHz}$ , high for this part of the solar cycle. If we now consider what this means for a signal which enters the ionosphere not vertically but at the sort of angles associated with radiation from beam antennas, then for a  $1,000$ -mile path and a F2 layer at height  $200$  miles, a critical frequency of  $5\text{MHz}$  will produce reflections from low-angle radiations up to about  $13.5\text{MHz}$  (see Fig 1) this being the muf. The mathematical relationship between critical frequency and maximum usable frequency is very roughly 3:1, ie maximum usable frequency is about three times critical frequency, so there is no point in getting excited about F2 propagation on  $50\text{MHz}$  until the observatories start to record critical frequencies in the region of  $16$  to  $18\text{MHz}$ , and we have a long way to go before this occurs.

Next month I will mention some of the geomagnetic indices, since these are relevant to auroral conditions, and hopefully we shall not have so long to wait for some of these events.

### From the postbag

Malcolm Appleby, G3ZNU, chairman of the VHF Committee, wishes to remind us of the Monday Night Award which was initiated last year to encourage more  $432\text{MHz}$  activity. Several people managed to work enough calls to gain the award, and as a result the committee has now decided to keep the Monday Night Award as a permanent feature, available at any time. A copy of the rules and an entry form are available from vhf awards manager G5UM, QTHR. All contacts must be made on a Monday between  $6\text{pm}$  and midnight on  $432\text{MHz}$ . Make a list of stations worked where the last letter of the calls form an alphabetic list, from A to Z. Two complete lists are needed for the award, one for Class A and the other for Class B stations. Stations outside the UK count as Class A contacts. QSL cards are not required for this award.

Subscriptions for the very useful *VHF Newsletter* published by RSGB under the editorship of David Butler, G4ASR, can now be renewed (new subscribers write or phone the Membership Services Department at RSGB HQ).

Still on the subject of newsletters, PA0QC, who is chairman of the IARU Region 1 VHF Working Group, is producing a new one for use mainly by IARU officers, the first of which came out in September. From time to time I will draw attention to any information of interest which appears in these letters. Issue 1 mentions a VHF Managers' Handbook prepared by DARC which is available to anyone, though supplies are limited. Also discussed were amateur satellites for the "third world".

John Matthews, G3WZT, believes that the current population density on  $144\text{MHz}$  makes the need for a calling channel unnecessary. I know at least one amateur who will gird up his loins on reading John's next comment, which is that "crystal-controlled transmitters are a thing of the past". John is not alone in his thinking that  $144\text{MHz}$  should be "more like an hf band". However, whereas in the south and other high occupancy areas  $144-300\text{MHz}$  is seldom vacant, I am led to believe that in more remote parts such as the north of Scotland and parts of GI, signals on the band are a rarity unless conditions are well up, so there is a distinct advantage in knowing on what frequency to sit while nursing the offspring and/or consuming warming beverages on a cold evening. The VHF Committee has views on this too. What do you think? ☐

## SWL

Bob Treacher, BRS32525\*

SUDDENLY, the vhf and uhf bands came alive and produced the best tropospheric conditions of the whole year. It was uncanny how, just as in 1985, they occurred at the end of September and early October. Before we reflect on those superb conditions, let us look forward to the activity we can expect in December and early January.

### Lower frequency

As we move toward Christmas we get nearer to the shortest day, which brings about some of the best lower frequency conditions of the year. Over the past few years as the sun rises or sets here in G-land so we have been blessed with exceptional conditions into the Pacific on both  $3.5\text{MHz}$  and, more especially,  $7\text{MHz}$ . It is well worth monitoring  $7,085\text{kHz}$  from 0700; this is where the ZL2AAG net meets. It specialises in Pacific dx working into Europe and northern Africa. For the past few years this net has provided many new countries for those who monitor the channel. Also around sunrise,  $7\text{MHz}$  is good for long path JA and KL7. Last year, JAs were audible until very late in the morning on most days. On  $3.5\text{MHz}$ , many W6 and W7 stations can be heard around sunrise. The USA west coast favours  $3,789\text{kHz}$  and  $3,796\text{kHz}$ .

At our sunset,  $3.5\text{MHz}$  tends to have the edge for ssb dx, while the cw dx seems to favour  $7\text{MHz}$ . Stations in the Pacific can be heard on the short path around sunset, together with signals from JA and VK. This year the UA9s and UA0s will be in the top  $10\text{kHz}$  of  $3.5\text{MHz}$  too. All in all, we look forward to a profitable period. The ultimate on  $3.5\text{MHz}$  is to hear W6/7 long path at sunset. From experience, the peak days and times are around  $1540-1600$  from 24 December to 3 January. Why not set yourself an aim over the Christmas break? Promise yourself to listen on  $7\text{MHz}$  between  $0630$  and  $0730$  on 24 December and tune around the top of  $3.5\text{MHz}$  between  $1530$  and  $1630$  on 28 December. I can guarantee that you will not be disappointed if  $dx$  is something new for you. I am of course assuming that you will be using an antenna capable of picking up the dx signals which come in at a low angle. Therefore, you will need a sloping dipole or an inverted-V, or something similar. Let me know what you hear. Hopefully, you may collect a couple of new countries in the process.

While we are discussing LF conditions, I imagine that you are wondering why I haven't mentioned  $1.8\text{MHz}$  yet. Well, here goes. Last season, the top band dx enthusiasts were disappointed with the lack of dx on the band. Openings to the USA were not particularly good, nor were conditions to the Caribbean—where a wealth of dx countries await us Europeans. This year, we can but hope that the band produces the sort of good dx which was available in 1985—plenty of W and VE, good openings to the Caribbean and the occasional South American, ie PY, YV etc. In the past, J37AH or 6Y5IC have held together an informal net of Caribbean stations from around  $0200$ , but the best time is probably later than that—around  $0500$ —and in February. One to look for this year from the Far East will be VS6DO who is to use  $1,831.7\text{kHz}$  to look for Europe.

One thing is sure, once a listener has achieved most of what can be achieved on the hf bands, and in these days at the bottom of the sunspot cycle that tends to entail listening on  $14\text{MHz}$  with the occasional foray onto  $21\text{MHz}$  when it is open, he or she will need to use the lower frequency bands more and more. Why not use these bands more this winter? Listening at the turn of the year will certainly pay handsome dividends. And for those licensed members who read this, please be sure that you have due regard to the limits of the  $3.5\text{MHz}$  band as far as intercontinental working is concerned. If the band is open for dx working then the dxers will prefer it if you do not start up local QSOs in the top  $25\text{kHz}$  of the band.

You may not be able to hear the dx, but others will.

### January challenge

The time has come to remind listeners that the LF Challenge will again take place between 1 and 31 January 1987. This popular event has been running for a few years now and every year it is supported by 20 or so logs. The aim is to log one station from as many countries as possible on each of  $7$ ,  $3.5$  and  $1.8\text{MHz}$ . Single-band entries are accepted too. Scoring will be the same as in the past:  $7$  and  $3.5\text{MHz}$ —each country from your own continent will count one point, each country from outside your own continent counts three points. On  $1.8\text{MHz}$ , each country from your own continent counts

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five points, while each country from outside your own continent counts 15 points. Only one station from each country can be logged on each band. Each log should include a list of countries in call sign order, together with the date, time, RS(T), full call sign of the station heard and the station worked, and the points claimed. Any station claimed with an RS(T) of less than 3×3 or 339 will be deleted from the log by the adjudicator. Logs should be sent to me at the address at the foot of page 870, postmarked no later than 27 February 1987.

## The 1987 tables

It appears to me that interest in the annual tables seems to have waned a little this year. Perhaps because band conditions have, in general, been poor, perhaps because I have been unable to reproduce a full listing every month, or for some other reason. Whatever the reasons, there will be an annual hf table for 1987, but we intend to run it a different way to try to entice some new faces as well as retaining the old ones.

For 1987 the aim will still be to log as many countries as possible during the year, but to encourage those who prefer the hf bands to the lf bands, the table is to be split into two. One for 28, 21 and 14MHz, the other for 7, 3·5 and 1·8MHz. You can enter a score for both tables if you wish, but the totals will be separate, so will the number of dxcc countries heard. At the end of the year we will have an hf champion and an lf champion. I hope you like the new idea and I look forward to your entries.

While on the subject of changes in the tables, the All-Time starting score will be reduced to 700 and a new column showing All-Time DXCC will be added. We will, as a result, have to lose the "mode" column. The uhf/vhf table will also change. For 1987 I shall include 50MHz, and to accommodate the change the figures quoted will be an addition of the squares and countries heard. However, please submit the squares and countries totals separately. I will add them together. It is hoped that these changes will tempt a few more entries, especially from the Society's newer members. Good luck and here's to a good year.

## 1986 HF COUNTRIES TABLE

(updates only)

Station	DXCC	28	21	14	7	3·5	1·8	Total
BRS25429	213	48	109	176	120	148	60	661
BRS32525	188	54	77	124	116	116	55	542
BRS87156	195	34	104	169	101	113	29	530
BRS1066	157	32	85	134	111	75	63	500
BRS31976	158	37	70	123	62	90	52	444
BRS20249	128	15	49	109	56	57	14	300
F11ATZ	-	47	69	16	16	26	9	183

## 1986 UHF/VHF TABLE

Station	Loc	70MHz		144MHz		432MHz		Total
		Squares	DXCC	Squares	DXCC	Squares	DXCC	
BRS32525	JO01	0	0	112	30	57	16	215
BRS31976	JO01	7	1	106	28	0	0	142
BRS25429	IO93	0	0	69	16	25	8	118
BRS52543	IO83	23	4	45	12	23	6	113
F11ATZ	JN15	0	0	38	10	4	3	55
BRS2088	JO01	0	0	27	10	2	1	40

## Worked All Britain

About 15 years ago, I was very involved in the WAB/HAB movement and was the first swl on the WAB Committee. I also used to spend many enjoyable Sunday afternoons with G3VLX/M giving many enthusiasts "rare" squares around the South East. I well remember our exploits activating TQ91 Kent (look it up in the atlas!). My attention has now been drawn to the resurgence of the WAB/HAB movement, which has now grown to such an extent to be equally active on 144MHz and worldwide too, as well as on 3·5MHz. The idea is that Great Britain and Northern Ireland are divided geographically into a grid system, dividing the countries into 100×100km squares eg NT, SO, TM etc. These large squares are then broken down into 10×10km squares which are given two number references eg 00, 01, 02 etc. The large square and the two number reference gives rise to the WAB area, eg NT00, SO01, TM02 etc. A number of awards are available for hearing, eg 300-2000 WAB areas.

A record book and further information is available to swls from G4KSQ, price £5, and a regular newsletter is produced which contains information on WAB.

## LF band contest

The White Rose Society have provided details of their lf band contest to be held on 17-18 January 1987. This is a very popular contest which suffered last year through lack of publicity. The rules are clear but lengthy so for further information send an sae to G3ZGA, 146 Street Lane, Leeds LS8 2AD. Now that the Cray Valley Society has temporarily suspended its swl

contest, White Rose is the only affiliated society providing a contest for the swl. Please support the event to ensure it stays in the swl contests calendar.

## HF news

Malcolm Harrington, BRS20249, bemoaned the poorish conditions for the Society's 21/28MHz contest. Those with beam antennas did not find the going quite so tough, but few if any swls have beams these days. Outside of the contest Malcolm's best appears to have been a CP on 7MHz ssb. Brad Bradbury, BRS1066, managed VK9X1 (remember the tip about getting a QSL card) on 14 and 21MHz cw. It was his 295th country all time. Others worthy of an entry in the log included 5B4/YU3XU on 7MHz, and 5H3RB on 21MHz cw. On the Oblast scene, he is now up to 90 confirmed, while other interesting QSLs included VQ9QA (1·8MHz), JT0XC, VE3ICR/VP2M and FG0BKZ/FS7 all for 7MHz. Tony Blackburn, BRS87156, also participated in the 21/28MHz contest and reported patchy conditions. Outside the contest Tony reported some good openings and mentioned A35AQ, HD8G and 5V7WD on 14MHz. 7MHz had produced VK9NS, ZL7EM and ZL7TZ from the Pacific, while ZS6BRZ had been logged from Africa. On 3·5MHz, he mentioned JG1FVZ/5N26, FM5BH1 and ZC4AP. Lots of candle burning has resulted in an increased table score. Tony travelled to Oxford for the Society's HF Convention and reported a pleasant day swapping dx stories with some avid dxers.

Two of our more experienced reporters, Dave Whitaker, BRS25429, and Robert Small, BRS8841, sent in brief reports on their lower frequency band listening. Dave was rewarded with VK9NS on both 7 and 3·5MHz, while Robert captured a juicy piece of dx in the shape of 9M2AX on 1·8MHz cw.

## VHF corner

Michel Monteil, F11ATZ, provided an update on his activity from JN15. The highlight of his summer was hearing F1EAN/7X (JM36) on 432MHz at 59—a QRB of 900km. This was during a good tropo opening at the beginning of July. On 144MHz, Michel reported Es on 26, 28 and 29 June —IS0YFG, F1BUU/TK (JN41), IS0AGP/IS0 and IS0LYN (both JN40), IM0UXZ (JM49). While in July he copied 9H4M working YU1WP; IS0EI/P (JN40) and EA6MR. He also mentioned C30BBX and C30C, but I am not sure if they were on tropo or Es. In a 11b batch of QSL cards he was particularly pleased with EA3IH/P (IN91), LZ1ZB (KN12) and YO7CJI (KN15). Oh to live in JN15!

Back home, I can report on the best tropospheric conditions of the year. Between 24 September and 4 October we experienced first-class dx conditions to Eastern Europe on both 144 and 432MHz. Mick Toms, BRS31976, logged plenty of DLs in the "E", "I" and "G" squares on the 24th, but he lists as his highlights of the whole period OK1KFQ (HK), OE5KE (HI), Y25IL/P (HL), SP6GZZ (IL), OK2KZR (IJ), OK1DPM (HJ), SP1PCE (HN), OE2AFM/2 (GH), Y25CD (GM), Y25QL (GL), OK1ON1 (GJ) and OK3KGW (JJ). All these were on 144MHz. In all, Mick logged 150 stations over 400km and 12 over 1,000km from his Essex QTH, which included 25 new squares and three new countries for the year and 12 all-time new squares.

Up in Yorkshire, Dave Whitaker fared even better, logging many of the stations being heard further south but which were at even greater distances. Dave concentrated on 432MHz, and on 30 September heard OE2KMM (GH, 1235km), OK1KE1/P (JO70, 1222km), Y27CN (FK) and DL9PW (FJ).

From my QTH it became quite a chore having to log so many OKs on 144MHz! However, it was pleasing to hear stations from OE on the band —Joan, BRS62088, logged OE5KE (JN78) and OE5EFM (HI), while the om heard OE5XDL (JN78) and OE3XUA (HI). On 432MHz the best dx was OE2KMM, OE5XDL, Y22ME (HM) and Y24BO (GM).

Quite remarkably, the conditions held for the 432MHz contest on 4/5 October. Both Dave and myself found the band to be in great shape, although at different times. Further south, conditions appear to have been at their best before sunset, but further north as darkness approached conditions got better. A comparison of the dx heard bears this out. Dave logged eight QSOs over 1,000km and 27 over 500km. Best dx was OK5UHF/P at 1,294km. My best dx was only 1,095km, with only two QSOs over 1,000km, but 44 over 450km. For uhf, our claimed scores were enormous, both for the RSGB contest and the concurrent IARU Region 1 event. It all goes to prove that there is life above 28MHz. Perhaps this latest report of good conditions will persuade others to obtain equipment for these bands for the 1987 dx season.

## Finale

I have held over the All-Time table this month as there were only two updates. Hopefully, I will publish it again in March. News, views, comments and table scores for inclusion in the February issue should reach me by 11 December, allowing extra time for the holiday period. □

# MICROWAVES

Mike Dixon, G3PFR\*

## Seasons greetings

All of a sudden it is winter: the rapid decline, in late October, of the weather over most of the UK has brought the autumn openings to an end. As I write this, the clocks are due to go back and only 11 weeks remain to Christmas. My thanks are due to all those contributors who have, during 1986, put forward information and activity reports on the goings-on on many of the microwave bands. Without their input, I would have found it rather difficult to put the column together.

In reviewing the year very briefly, 1986 appears to have been one of generally depressing weather over many parts of the country, with few openings, and consequently activity levels which may not have been as high as in preceding years when the weather pattern was rather more favourable. What has been apparent is the increasing numbers of newly-licensed stations who are coming on the microwave bands, mainly 1.3 and 10GHz, but also some on 2.3 and 24GHz. It was particularly encouraging to see and welcome this influx.

The coming months of comparative inactivity for many operators should give the enthusiast the incentive to build equipment for all or any of the bands. It may be timely to remind readers that the Microwave Committee is keen to encourage construction and operation, particularly on the bands above 2.3GHz. There are now adequate designs for both 1.3 and 2.3GHz and even some commercial gear or kits available for the two lower bands. New thinking and new designs, new activity and new operators are all needed on the higher bands, particularly since there is spectrum "pressure" around, not just in the UK, but in all regions of IARU.

Areas of amateur microwave work which we would like to see growing in 1987 are: beacons, fixed station working on the higher bands, increased levels of narrowband activity, particularly at 10 and 24GHz, exploitation of some of the newer techniques and components in the design and building of equipment, propagation studies and so-on. There are so many potential activities that I could fill a whole column with suggestions!

Don't forget the design/construction competition, and just a reminder that the components service is available to supply many of the hard-to-get components which you may need for your winter projects. Please let us know what you are doing and what your needs might be. A merry Christmas and a prosperous New Year to all!

## Now it can be revealed

There have been a number of remarks to the effect that the technical content of the column has fallen over the past couple of years. There are three reasons for this. First, there have been comparatively few novel or significant ideas brought to our notice. Second, there has been a need to publish technical matter in the *Microwave Newsletter*, rather than in the column (due to space limitations). Last, but not least, I can now reveal that, for the past three years, committee members (and many others) have been heavily engaged in gathering ideas and assessing reliable designs to be compiled into a new *Microwave Manual*. This task is now in its final stages and the long-projected manual should be making its appearance in the spring next year. It is designed to be a balanced mixture of (largely) non-mathematical theory, coupled with practical chapters, band-by-band, covering the construction, setting-up and use of reliable amateur designs for all bands from 1.3GHz to 24GHz. Some of the background has been derived from earlier editions of the *VHF/UHF Manual*, updated and expanded as new ideas and new components have come into the amateurs' "armoury". However, there is also much new thinking and design work incorporated into it: remember that this is now the only area of the hobby where "black-boxes" do not reign supreme—although there are some for 1.3 and 2.3GHz!

There are also some fairly speculative ideas, particularly at 10 and 24GHz, arising from the appearance (at amateur prices and availability) of some quite remarkable new devices and techniques, all of which should enable the more adventurous microwave operator/constructor to move forward from the well-established techniques, of the past 10 years or so, and into "future" technology. It is hoped that the careful expansion of the

components service, the re-introduction of a constructional competition and the publication of the new *Microwave Manual* will encourage and stimulate UK amateurs back into the forefront of construction and experimental amateur radio at frequencies above 1GHz.

## Operating news and views

For Sam, G4DDK (Suffolk), the good conditions at the end of September yielded a number of new squares on 2.3GHz: DK2KAL (JO30,DK), DK3OL and DJ6JJ (JO31,DL), ON6OO, PA3DZL and PE1AKJ (JO21,CL). Several days later he worked OE2KMM and OE2CAL (JN67,GH—969km), followed by contacts with DG1NZ (JN59,FJ) and DF7VX (JO41,EL). The IARU Region 1 contest in early October yielded more contacts, the best of which was OK1AIY/P (JO70,HK—at 939km), just missing the 1,000km mark! Sam mentioned that the OK station was worked by many other UK stations further west, so that the 1,000km mark "must have been passed many times—there should be a spate of claims for the first contact over 500km—assuming he QSLs". On the east coast it seems that "incredible conditions existed on all the bands in use—432MHz to 3.4GHz—for the first six hours of the contest, the higher bands dropping out for the rest of the contest. Interestingly, conditions started to show signs of improvement right at the end of the contest, too late to recover lost scores. My average contact distance on 2.3GHz during the contest was 293km".

Much further west, Dave, G4FRE, operating from south Wales, is likely to put forward claims for several "firsts", notably GW/OK, GW/OE, GW/OK on 2.3GHz and GW/SP on 1.3GHz.

Ian, G8IFT (Birmingham), also reported the latter half of September as "showing a good deal of activity on both 1.3 and 2.3GHz". Recent 2.3GHz contacts were with G8ZQB (near Leicester), G6DER (near Barnsley) and G4XUM/P (near Buxton), each providing a new county, as distinct from dx worked in the past! On 1.3GHz he had a contact with OE2CAL at 1,194km, but apart from this QSO not much else in the way of dx was worked. Some Midlands stations heard OK1CA but no QSOs resulted.

Frederick, G6FK (Wolverhampton), reported many bits of information on 1.3GHz activity: G3AUS has now worked G14OPH and G14CXH; the latter is still maintaining skeds with G6LEU, without results so far. G4LU (Oswestry) and G3KFD are regularly exchanging signals with G6LEU. G8WPL has worked G3AUS over a difficult path. My fellow columnist Ken, G8VR, has now made an appearance on 1.3GHz and has worked G3AUS, while GW8FKB, GW2HIY, G6DER, G8JHL, G4CBW and EI6AC are also regularly active on the band. G8SWZ, G8UYR and G1AEF are out most weekends on 10GHz and continue to maintain a strong interest on that band. The Midlands appears to be quite a "hot-bed" of all kinds of activity!

Claims "dropping through the letterbox" to Jack, G5UM (microwave awards manager), included the following:

G1DOX—1.3GHz: 15 squares award (old QTH in Shropshire);  
G1DOX—1.3GHz: 10 squares award (new QTH in Barrow-in-Furness);  
GM6MGS/P—1.3GHz: 25 squares;  
G8WPL—1.3GHz "Senior" (No 16)—this is a rarity, since only 16 awards have been made since 1976!  
G1DOX—2.3GHz: 5 squares (No 13), the first by a G1 station;  
G4BYV—2.3GHz: 40 squares (50 worked but with a poor return on QSLs) .  
G4KIE/P—150km award on 10GHz (80)  
GW1MPW/P—150km award on 10GHz (81) achieved in poor weather conditions on the well-known Dartmoor to Preseil path.

Jack asked me to remind you that claim forms for all microwave awards can be obtained from him (QTHR) on receipt of an sae.

## Technical items

John, G4BYV, adds comments on the use of the YD1060: he has them in two DK1UV amplifiers on 3.4GHz, each giving some 4W from the output of an interdigital mixer. He adds: "There is no problem in getting 6W. DF5QZ states that 10dB gain is possible at 7GHz. With 6V heater voltage and a maximum of 500V on the anodes, he is using an anode current of 80mA on 5.7GHz in ssb mode. DL4EBB uses two valves on 3.4GHz and with 400mW drive, 400V on the anodes, 25mA standing current is getting 8W output. Modifications to the DK1UV cavity (making the cavity slightly larger by placing a 0.2mm 'washer' under the anode ring) results in more output. The grid ring is important—I made a spring from silver-plated wire (similar to the G4PMK/G3SEK suggestions for 1.3GHz amplifiers published some time ago in *Radio Communication*) and mounted this in a groove around the grid ring of the cavity."

All useful information—thanks, John.

\*"Woodstock", Gaze Bank, Norley, Warrington, Cheshire WA6 8LI.

# COMPUTING

John Morris, GM4ANB\*

## Spectrum morse tutor

Program 1 is a skeleton morse tutor program for the Spectrum. It sends the plain language string defined in line 50. If you can persuade a member of the household, even a non-amateur, to count out a 36 word sequence and type it into the computer, you can have an instant practice morse test.

Lines 10 to 40 initialize the program. The speed is set by variable "dl", in line 20. The words per minute will be approximately 1.2/dl, so that the value of 0.1 shown will produce 12wpm. The code that comes out is reasonably respectable up to 15wpm or so. The note can be changed by changing variable tn, also in line 20.

The code is sent by the subroutine starting at line 100. It sends the text in string variable m\$. The text can be a long string, as in program 1, or a single character. By altering lines 50 and 60 and adding new sections you can enhance the program to do many of the other things seen in morse tutors, such as random groups of letters or digits. If you are feeling ambitious you could even enter a large number of different texts and get the program to select between them randomly.

### PROGRAM 1

```
10 DIM c(128)
20 LET dl=0.1: LET tn=15: LET pl=dl*50
30 FOR j=48 TO 57: READ c(j): NEXT j
40 FOR j=65 TO 90: READ c(j): LET c(j+32)=c(j): NEXT j
50 LET m$="The foolish fox jumped the hungry dogs"
60 GO SUB 100: PRINT m$: STOP
100 FOR j=1 TO LEN m$: LET t=c(ORD c(m$(j)))
110 IF t=0 THEN PAUSE pl*2
120 LET t=t/2: IF t<1 THEN PAUSE pl*2-1: GO TO 150
130 BEEP dl*(1+4*(t-INT t)),tn: PAUSE pl-1
140 LET t=INT t: GO TO 120
150 NEXT j: RETURN
200 DATA 63,62,60,56,48,32,33,35,39,47
210 DATA 6,17,21,9,2,20,11,16,4,30,13,18,7
220 DATA 5,15,22,27,10,8,3,12,24,14,25,29,19
```

## Diy QSL cards

Have you ever thought of producing your own QSL cards? If you have a computer and a printer in the shack it can be surprisingly easy. There are so many different types of printer around that it would be pointless for me to give a program for this. They all use different control codes for special effects such as wide and narrow text, bold printing, or graphics, and there is very little compatibility between different makes. Instead, I have included a few examples of the sort of thing that can be produced, and will leave you to experiment.

Before writing your program you will need to delve into the printer manual. Most modern printers will accept a wide variety of control codes to produce various special effects. They can be single characters or sequences of several characters. The manual should list all of the control codes you can use. When reading it, take care not to get confused between decimal and hexadecimal; some manuals do not always make it clear which they are talking about. If your printer is fairly modern you will find that this section of the manual spreads over several pages. To save yourself time, make a short reference list on a single sheet of those you think you will want to use.

Now you have to find some way of getting the control characters out to the printer. The most common way is to use CHR\$ in a PRINT, PRINT # or LPRINT statement. For example, my ancient but trusty Microline uses ESC (Ascii 27) followed by "8" to shift into eight lines-per-inch mode. To send this from a Spectrum the appropriate statement would be:

```
LPRINT CHR$(27);"8";
```

On the BBC use VDU 1 to make sure that control codes only go to the printer, and not to the screen, as they will tend to upset the display in unpredictable ways:

```
VDU 1,27,1,56
```

This sends ESC and "8" (Ascii 56) to the printer only.

When you have worked out how to get control codes out of the computer and into the printer you can start experimenting with some QSL designs. The program will end up as a sequence of PRINT or LPRINT statements interspersed with control codes to get the special effects. The QSO information can either be held as DATA or be INPUT from the keyboard.

\*6A Morlich Grove, Dalgety Bay, Near Dunfermline, Fife KT11 5UX.

# G4ANB/P

The Lizard, Cornwall. IN79JX WS71

To radio G1WMF

Confirming our SSB QSO on 144 MHz  
at 23:32 gmt on 6 September 1986  
Your report: 51 (Ser 261)

John Morris, 6A Morlich Grove, Dalgety Bay, Dunfermline  
Scotland  
(a)

# G4GKO

(4X4ARC) ex: ZD8RR, VP8OA, ZB2ON, VP9IR, ON8IV



To ARS: WXYZ

Confirming our 2 x CW QSO on 14 MHz at 1430G  
on 4:MAY:86 your RST was:- 5 9+ 9

----- MY LOCATOR IS IO90WN -----

Chuck, this is a demonstration of the sort of personal-  
ised message that may be produced by Option.7 of the  
QSL programme described in the article 73

*Rm*

RON RODEN, 27 Wilmington Close, Hassocks, W. Sussex, BN6 8QB, England  
(b)

=====

G4GKO 4X4ARC ex:- ZD8RR VP8OA ZB2ON VP9IR ON8IV

OP:- RONALD RODEN

QTH:- 27 Wilmington Close, Hassocks, W. Sussex, ENGLAND, BN6 8QB

To ARS: WXYZ

Confirming our 2 x CW QSO on 14 MHz at 1430 G  
on 4:MAY:86 your RST was:- 5 9+ 9

Chuck,, I really enjoyed our QSO so nice to have  
an interesting chat and not a stereotype name, QTH  
and report, 73

(c)

Fig 1. Examples of computer produced QSL cards. (a) Entirely computerized, using two labels; (b) A single computer written label on a pre-printed background card; (c) Printout cut and pasted to a plain postcard.

Once you have something pretty all you have to do is set it onto a suitably sized piece of card. Here I strongly recommend that you invest in some "continuous labels". These are sticky labels attached to a backing with sprocket holes designed to fit most printers. You simply replace the printer paper by the labels, and print away. When they are done they can be peeled off and stuck to a postcard.

Computer labels come in many sizes, but I find the most convenient to use are 102 by 36mm (approx 1 by 1.5in). These will hold eight lines of text, each 40 characters long with normal spacing—plenty for even a chatty QSL. If you compress the characters and squash the lines together you can fit on maybe a dozen lines of 60 or more characters. Labels are available from computer stationery suppliers, or can be found in small quantities in the larger branches of some of the high street shops.

Some examples of computer produced QSLs using different techniques are shown in Fig 1.

For my own cards I use two labels per card. One is printed with the call sign, in very large letters. The other has the QSO details (Fig 1a).

G4GKO uses a pre-printed backing card, with a single label bearing the QSO details (Fig 1b). This gives a pleasant mix of conventional and new technologies.

As an alternative to sticky labels, it is possible to use normal printer paper. The whole QSL, call sign and QSO details, can then be printed in one go (Fig 1c). The main disadvantage of this is that it involves a scissors and paste job before the card is ready to be sent out.

The examples shown in Fig 1 are all quite simple. With modern printers, supplying features such as bit-graphics, much more interesting designs should be possible.

My thanks to Ron Roden, G4GKO/4X4ARC for permission to use his cards as examples.

## Christmas Competition

Time for another Christmas Competition to help you pass those terrible hours between the kids receiving their presents and the batteries running out. Last year's competition was very mathematically oriented, so this time we'll give the artistic side a chance.

The aim is to find the best home-made, computer produced QSL card. The cards must be standard size (140×90mm), and must have been produced on typical amateur equipment. No Macintoshes and Laser printers, please—that would be too easy! No prizes, but the best efforts will be displayed in April's *Computing*. □

# SATELLITES

Bob Philips, G4IQQ\*

THIS MONTH sees the 25th anniversary of the birth of amateur radio via satellite. It was on 12 December 1961 that OSCAR 1 was placed into orbit carrying just a 100mW telemetry beacon operating on 144.98MHz. Reception reports were received from some 600 observers during the three week lifetime of the satellite. A number of events had been planned to commemorate the occasion but the precarious state of OSCAR 10 and the heavy eclipse of FO-12 has unfortunately made this impossible. What may well be organized, according to *Amateur Satellite Report*, is a 25th Anniversary Experimenters Club Award, however no details are available at the time of writing.

## FO-12

The new satellite appears to be performing quite well and its timing on the amateur satellite scene could not have been better. The period of eclipses which began in early October will not be over until the third week of December and this has meant that full operation of the transponders has been somewhat delayed. This was particularly so for the digital transponder, mode JD, which, as far as I have been able to ascertain, had not been fully commissioned by the end of October.

Last month I mentioned the need for a special modem for this mode of operation and that one had been designed by James Miller, G3RUH, who has provided the following information. To use JAS-1 mode JD digital mailbox you need a special JAS-1 modem. The G3RUH pcb (which measures 160×100 mm) is suitable for any tnc design where the internal (Bell 202) modem can be by-passed, which includes TAPR's TNC-1 and TNC-2 designs. Automatic doppler shift tracking is possible via the up/down lines of the receiver (all known Yaesu/Trio/Icom standards). The pcb is available from AMSAT-UK, London E12 5EQ, England for £16.50 UK/Europe and £17.50 airmail to the rest of the world. AMSAT groups requiring more than 10 pcbs should contact G3RUH direct at 3, Benny's Way, Coton, Cambridge CB3 7PS, England. It is still not known when the digital transponder will be brought into active service but G3RUH understands that the telemetry beacon of the JD transponder may be activated in the near future and could be organized to transmit unidirectional packet messages for testing purposes. Final word on FO-12 is that the complete OSCARLATOR for the satellite, comprising polar map, satellite groundtrack and range circles are available from AMSAT-UK (at the address given above) for the price of £1.15 UK and £1.35 to Europe.

\*Transvaal Cottage, New Barn Road, Swanley, Kent BR8 7PW.

## Oscar 10

A further significant loss of on-board memory cells was reported during September/October and several predictions have been made of the imminent demise of the satellite. It appears that the expected power-down during the eclipse period did not in fact occur. Reports of beacon reception continued throughout the period though it was not possible to make any sense from the telemetry information. At the end of October very strong signals were received at this QTH from both the general and engineering beacons at the same time. Unfortunately the satellite was designed to operate under the control of the on-board computer and failure of this effectively means that an otherwise operational transponder cannot be activated. Provided there is adequate memory capacity remaining it may be possible to up-load a very limited command program to squeeze a little more life from the satellite.

## Uosat

Speaking of anniversaries, I omitted to mention that Uosat Oscar 9 celebrated 5 years in orbit on the 6 October. The satellite was originally launched into a 550 km polar orbit, but this has since fallen to around 500 km. The satellite has had its fair share of problems during the 5 years but with its new operating software it is providing even better service than before.

There has been heightened activity on some of the scientific packages on Uosat Oscar 11 during recent months. Of particular interest was the series of measurements using the particle/wave experiment. For a period of about two weeks the orbit of the satellite was almost in conjunction with that of the Viking satellite and this provided a unique opportunity to carry simultaneous measurements from both satellites.

There has also been considerable work carried out on the attitude determination and control for the satellite. After analysis of the data it was determined that due to drift in the calibration of the magnetorquers, new telemetry equations were required. These are as follows:

channel 1:  $B_x = 0.1468 \cdot N - 68.3$

channel 2:  $B_y = 0.1435 \cdot N - 64.9$

channel 3:  $B_z = 0.1500 \cdot N - 69.8$

where N is the telemetry value and the units are given as nanoTeslas.

Early watchers of the Uosats will recall the availability of satellite orbital data from recorded message facilities at the university. In fact this service is still available although at the time of writing, only one phone number was in operation viz Guildford (0483) 61202.

## RS satellites

To complete the story on satellite birthdays, 17 December is the day five years on from the successful launch of the six Soviet amateur satellites, RS3-RS8. Only two (RS5 and RS7) remain in operation but their simple mode A transponders continue to provide the easiest entry into, and perhaps most rewarding aspect of, amateur satellite operation.

There is still no definite news about the next satellites in the RS series, RS9 and RS10, so we shall have to continue to wait patiently.

## Weather satellites

I receive a number of enquiries from readers who are interested in weather satellite operation and would like to see some more information included in this column. With the high level of news items concerning amateur satellites for many months this has not been possible. To try to make some amends to this, I have compiled the following list of operational satellites together with their major parameters.

Satellite	Period (min)	APT/WEFAX freq (MHz)
NOAA 6	101	137.5
NOAA 9	102	137.62
NOAA 10	101.2	
Meteor 2/9	101.9	137.3
Meteor 2/13	104	137.4
Meteor 2/14	104	137.3
Meteor 3/1	109.3	137.85

APT: Automatic picture transmission  
WEFAX: Weather facsimile.

The NOAA (National Oceanic and Atmospheric Administration in the US) satellites all use the APT format with two images transmitted simultaneously, one in the infra-red part of the spectrum and the other in the visible part. Transmission is at 1,200 lines/min and amplitude modulation of a 2,400Hz sub-carrier tone is employed: five per cent modulation represents black and 80 per cent modulation white. Each new line starts with a synchronization pulse of 100 per cent modulation followed by the modulated signal. Each line takes about half a second to transmit and the signals will soon be recognized by their characteristic clock like sound.

Signals from these satellites are quite strong and can easily be received with simple equipment. Receive converters are available from a number of sources as well as antennas designed for the frequency. □



# QRP

George Dobbs, G3RJV\*

## The G QRP Club CW Winter Sports 1986

The G QRP Club Winter Sports is the event that most UK QRP operators wait for each year. It is a friendly informal radio activity event in which QRP operators are invited to make as many two-way QRP contacts as possible. It is not a contest but an activity period for enjoying QRP contacts. It runs from 26 December to 1 January, inclusive. So from Boxing Day to New Year's Day QRP operators seek each other on the bands. In previous years there have been set frequencies at set times, but the current state of the bands makes this difficult.

To take part in the event, a station must use a power not exceeding 3W rf output or 5W dc input. Call, or listen for, "CQ QRP" on the international cw QRP calling frequencies: 3,560, 7,030, 10,106, 14,060, 21,060 and 28,060kHz. With no set band plan, the obvious approach is to attempt to use the highest open frequency, although I suspect that this year most of the activity will be on 3.5 and 7MHz.

Although the event is not a contest, a prize is awarded each year to the station thought to have contributed most to the event. This is the G4DQP Trophy which is not automatically awarded to the station making the most contacts or working the best dx, but for the best overall contribution to the success of the event. Logs, reports and comments may be sent to the G QRP Club communications manager, Angus Taylor, G8PG, 37 Pickerill Road, Greasby, Merseyside L49 3ND.

## The OK-G QRP Tests 31 January-1 February 1987

Following the very successful pilot tests carried out in February 1986, all UK QRP operators are invited to take part in a further series of tests between Czech and UK stations on the above dates.

Mode: CW  
Power: Not exceeding 5W rf output  
Contacts: With OK QRP stations  
Time/frequency schedules: (The following are all plus/minus QRM)

Time (gmt)	Frequency (kHz)	Time (gmt)	Frequency (kHz)
0800-0900	7,030	1430-1600	10,106
0900-1100	10,106	1600-1700	7,030
1100-1200	14,060	1700-1900	Rest period
1200-1300	21,060	1900-2100	3,560 (alternative 3,570-80)
1300-1430	14,060	2100-2300	1,900 (alternatives 1,840 and 1,815)

The above applies on both days. Where alternatives are given they should be used if interference is too bad on or near the original frequency.

This is not a contest, but merit certificates will be awarded for outstanding logs. The event is organized jointly by the Czech QRP Group and the G QRP Club. Logs to be submitted (as soon as possible after the event) to A D Taylor, G8PG, 37 Pickerill Road, Greasby, Wirral, Merseyside L49 3ND.

## A new book for constructors

Few constructors of amateur radio equipment cannot have heard of Doug DeMaw, W1FB. For nearly 20 years he was a technical editor with the ARRL during which time his technical articles in *QST* became known for their simple and lucid approach to building amateur radio equipment. He co-authored *Solid state design for the radio amateur* with W7ZO1, a book that has become a standard work for constructors. In 1983 Doug retired to the family farm in Michigan but he is still active in article writing and book editing.

The first book to come from this new period of his amateur radio activity is the *QRP Notebook*, which is designed for the amateur radio constructor who wishes to build and understand simple station equipment. The book presents a range of practical projects from a simple 1W transmitter (appropriately called *The Poor Ham's QRP Rig*) to full transceiver designs. All of the circuits offered are capable of construction by the average amateur without access to special components or sophisticated workshop facilities.

The best feature of the book is that it is not just a book of circuits to build. The author discusses the evolution of the circuitry and the choices of techniques and components. The approach encourages understanding of how the circuits work and how they might be altered, or sections of them used in conjunction with other projects in the book or elsewhere. The style is such that the reader could easily begin to take those first steps from the

slavish following of a published circuit to making use of circuits as a starting point for individual experimentation. Few experienced constructors build a circuit exactly "as is", but those steps between exact duplication of a circuit and creative use of published material are sometimes difficult. This book will help by offering what the author calls "guidelines for basic design activities".

The book contains designs for receivers, transmitters, transceivers and station accessories as well as useful advice on workshop practice and QRP operating. It is written in that folksy style which makes articles by W1FB come alive. There is some simple theory, but complex mathematics are replaced by rule of thumb advice. If you enjoy building and experimenting with amateur radio equipment, without spending a lot of money, and the satisfaction of using homemade equipment on the hf bands, then you will enjoy this book. *QRP Notebook* by Doug DeMaw, W1FB, is published by the ARRL and is available from RSGB Publications (Sales) at £3.75 (£4.41 to non-members).

## Sorting out those bits and pieces

In any endeavour, it is odd how experienced hands can assume beginners are fools yet, at the same time, imagine they have knowledge they do not possess. Beginners in amateur radio construction not only have problems in reading a circuit and translating it into a practical layout, but sometimes they do not understand the nature of electronic components. I suspect that many seasoned constructors are not too sure about which capacitors are suitable for particular jobs and how to choose suitable components for some applications. Practical articles in magazines either state the type of component required or more often leave the task to the wit of the reader.

Cambridge QRP Components, a new small electronic component company set up by G4KJJ, have attempted to provide a guide to components for the new or not so new constructor. They have produced a booklet, *CQC Component Guide*, which discusses the various options available for the common components in amateur radio construction. I consider myself a seasoned constructor but it taught me a thing or two. It is available from Cambridge QRP Components, 30 Rookery Close, St Ives, Cambs PE17 4FX, for £1.65 including postage.

## G QRP Club re-organization

When the G QRP Club was formed in 1975, it began with 34 members and it took two years to raise 100 members. The last few years have seen an amazing increase in interest in QRP operation and building QRP equipment, and the club is now poised to enrol its 4,000th member. Like most amateur radio clubs, the administration and routine depends upon the goodwill of amateurs who give their spare time and still hope to have some left for doing the hobby themselves.

The work of ordering and administering membership is now such that the club had decided to move to a system of annual subscriptions all due on the first day of each year. Members are requested to pay their subscription renewals at the beginning of each calendar year from 1 January 1987. The subscription rate is now £5 (or \$10) and the subscription should be sent to the membership secretary, Chris Page, G4BUE, "Alamosa", The Paddocks, Upper Bedding, Steyning, West Sussex BN4 3JW. The membership list will close on 31 January and members who have not renewed will be deleted. Members renewing their subscriptions are asked to quote their name, callsign (if any) and club membership number.

## Interested in morse?

If you like using morse there is a new magazine which will be of interest. *Morsum Magnificat* caters for all those with an interest in the traditions and practice of morse telegraphy, from its earliest conception to the present time. Since 1983, it has been produced in Dutch by Rinus Hellemons, PA0BFN, and Dick Kraayveld, PA3ALM. Now, Tony Smith, G4FA1, has joined the editorial team as English language editor, and an English translation is available, by post, worldwide.

The Dutch edition has already attracted articles by morse enthusiasts in many countries and it is hoped that the English edition will attract even more contributions, providing a truly international source of morse interest, record and reference.

The UK subscription is £6 per year (four issues), postpaid. Cheques payable to *Morsum Magnificat* should be sent to: Tony Smith, G4FA1, 1 Tash Place, London N11 1PA. Overseas subscriptions, US\$10, in banknotes please, to M Hellemons, PA0BFN, Holleweg 187, 4623 XD Bergen op Zoom, Holland. Issue No 2 is scheduled for winter 1986. Subscriptions can date from issue No 1, autumn 1986, if required. Please indicate your preference when subscribing. ☐

\* St Aidan's Vicarage, 498 Manchester Road, Rochdale OL11 3HE.

# RAYNET

Geoff Griffiths, G3STG\*

## Zonews is out

Judging from the remarks passed by certain group and county controllers about the "non-arrival" of *Zonews*, it would appear that Zonal coordinator G3TJP who writes and produces the copies may have a problem of distribution—or does he?

*Zonews* was started principally to give Zonal representatives an insight into what was going on in the national emergency communications area as well as the Raynet Committee and to act as a platform for the dissemination of information between them—an excellent opportunity for them to "blow their trumpets" in public! They are expected, of course, to pass on these tidbits of knowledge and interest to their county and group controllers. On the other hand, how many groups initiate contact with their zonal representative themselves, rather than waiting for him to do it all? G3TJP finds it excruciatingly difficult to prise contributions from either zonal reps or county/group controllers—funny how vociferous people can be on nets and at meetings, but so apparently reluctant to apply pen to paper when it comes to providing input to a news-sheet with the inevitable consequence that most of the words for *Zonews* are supplied by G3TJP and G3STG.

The opening paragraph posed the question of distribution difficulties. The mere cost of mailing *Zonews* to some 250 controllers throughout the country, even at 2nd Class letter rate, would be in excess of £60. It would be completely unethical to expect the RSGB to pay these postage charges since Raynet members account for a mere eight per cent of the total RSGB membership. Groups have been known to call meetings to determine the best way to obtain their copy of *Zonews*, and there have been rumblings of certain groups offering subscriptions of £5 if they could be assured of their particular copy. There are, of course, other groups who would rather not subscribe at all.

G3TJP is highly delighted at the popularity of his efforts, but says that he finds it difficult to produce *Zonews* on a regular basis, due to work and family commitments, and thus he is not willing to guarantee a set number of issues a year. Nor is he persuaded that the levying of a subscription on groups to provide such a payment to be in the best interests of the Raynet organization as a whole. It is submitted that only by maintaining the present production and distribution methods can the spontaneity of *Zonews* be fully preserved. Groups who wish to receive their copies other than through their zonal rep are therefore recommended to lodge A4-size stamped (first-class rate), self-addressed envelopes with the chairman of the Raynet Committee (G3STG QTHR) and their individual copy will be forwarded when available. Raynet members should appreciate that the effort of printing and publishing *Zonews* is completely voluntary and the people concerned in its production have absolutely no desire to change this policy.

## Supplies

Members will have heard with great regret that Mrs Jane Ballestrini has regrettably decided to retire. Jane has been a most efficient and helpful Raynet supplies officer for the past 16 years, and I'm sure that all Raynet members will join in saluting this exemplary voluntary effort on our behalf.

South West Hants and East Dorset Groups recently helped to man an RSGB bookstall/Raynet stand organized by the regional representative at Hamfest '86. Contact was made with a number of Raynet members from other parts of the country. The idea of a joint stand is commended to other groups as an effort to increase awareness of Raynet, particularly at club level.

## Communication

It is interesting to note that a large number of Raynet Committee members are subscribers to Prestel, and the Mailbox medium is used very effectively for the interchange of information between them. Members of Raynet, particularly zonal representatives, county and group controllers, are invited to advise me of their Prestel Mailbox numbers so that a suitable list for use within Raynet may be compiled.

## Zonal representatives

The routines were completed recently for the selection of candidates for Zones 5, 6 and 8, and because they were the only nominations received for these three zones Messrs Jackson (Zone 5), Ray (Zone 6) and Cardwell

\* 11 The Grove, Ashfordby, Melton Mowbray, Leics.

(Zone 8) are now confirmed as the new zonal representatives. No—I'm not knocking the new zrs, in fact I want to take this opportunity of wishing them well in their new appointments. Rather I'm trying to ask if we, as members of Raynet, are sufficiently interested in the organization to be bothered about nominating and perhaps electing those of our number who are interested and motivated to volunteer their services for the job. It doesn't stop at zonal representatives either. There are a number of group controller posts throughout the country that are vacant at present because, either the members of the groups are lacking the necessary guidance, or there is nobody around who is willing to do the job. Or maybe you won't stay in Raynet if old so-and-so is elected simply because you don't like him. There is an excellent opportunity for you to stand for election at your next group agm. You could be surprised at the support old so-and-so gives you so willingly. Ever thought of standing as group membership officer, or perhaps as group secretary then somebody else can stand as group controller?

I have come to think of Raynet as almost being a "family" affair simply because, when we join Raynet, we are invited to take part in exercises which are meant to train us as individuals to become more efficient members of our group. From birth children are trained by their parents and teachers to become acceptable and efficient members of a group—in this instance the family group. How many Raynet members can boast of a wife, husband, brother, sister, even father or mother as full members of Raynet in their own right? Interesting too, to note how many sequential call signs there are which have been issued to members of a family. Later, when the younger members have left home to start life on their own in perhaps another part of the country, they have maintained their links with Raynet and transferred to a local group. This can do nothing but good.

## City centre racing

For Raynet members from groups far and wide the August Bank Holiday weekend in Birmingham was something very special when Raynet operations were mounted for a road race through the centre of the city. Planning for the event had started many months before with joint meetings between St John Ambulance, Police, Fire, Metropolitan Ambulance and Raynet. Raynet's task was to provide communication cover for the multitude of first-aid teams out alongside the track in the spectator areas. The possible consequences of an accident resulting in a car coming over the safety barriers were to the forefront of everyone's mind. A forward control centre was manned alongside the track in a control caravan, and also at the centre were seven fire appliances, four ambulances and Fire, Police and Metropolitan Ambulance controls. The St John Ambulance control centre was located at their HQ in Lionel Street, some way from the circuit, and it was here that the Raynet control and management operators were located. The control centre operated nine uhf and vhf radio networks simultaneously, and the fact this was technically possible from one small control room was a tribute to Peter Best's standard remoting interface, and to the hard work and expertise of the engineering teams. Extensive use was made of inband and crossband talkthrough units.

Meanwhile, out alongside the track, St John Ambulance had asked that an operator be provided to accompany each of their foot patrols, and this meant that it was necessary to field 110 operators on both days of the event. West Midlands Raynet obviously could not have managed all this out of their own resources, and volunteers from Raynet teams in Buckinghamshire, Gloucestershire, Worcestershire, Leicestershire, London, Manchester, Northamptonshire, Rutland, Shropshire, Staffordshire and Warwickshire assisted the members from the West Midlands Metropolitan County. Due tribute should be made in all this to the forbearance of other Raynet teams in the West Midlands who had their own busy programme of activities at the same time!

## El Salvador

An earthquake in the central American city of San Salvador once again presented Raynet operators in the UK with an opportunity to put their expertise and organization at the service of the community. As in the Mexico City disaster, public communications systems were badly damaged and early casualty reports to the Foreign Office and to the British Red Cross relied on amateur radio channels. In particular, early details of supplies and drugs requested were vital in order to ensure the early despatch of relief, and it was amateur radio which was able to confirm that no British citizens were among the casualties. The levels of enquiries from the UK regarding missing family and friends were at a low level. Nevertheless, much valuable work was done on welfare traffic, and once again the excellent working relationship between Raynet in the UK and the International Amateur Emergency Network operators proved absolutely invaluable. Has your group identified its duty operators for this type of operation yet? Details from G3STG. □

# DATA COMMS

Ian Wade, G3NRW\*

## Connect International

In October the RSGB launched *Connect International (CI)*, an 11-page monthly packet radio newsletter edited by yours truly. The intent of *CI* is to try to keep readers up to date with what is happening throughout the world of packet. The big advantage of the newsletter compared to this column is that we now have room to breathe. There is room to quote readers' letters in full (whereas on this page I can only extract a line or two). Room to include complete articles from other publications, circuit diagrams, cries for help, detailed information on bugs and fixes, technical discussions on protocols, networking, or whatever.

Another feature is the very short lead time between preparation of the final copy and distribution to subscribers. Final copy date for *CI* is the 8th of each month, and it is printed and on its way by the 15th, meaning that the hottest news is only a week old. The advent of *CI* does not mean that this column will cover less packet—the mix of topics will remain more or less the same as now, the principal difference being that the more interesting details will in future find their way into *CI* instead.

## Address bits

Since I last included a list of data comms special interest groups in this column almost a year ago, several new groups have sprung up, one group is alas no more (RAMTOP), and there have been several changes of address. To bring the picture up to date, therefore, here is a new list.

**AMRAC** (Amateur Radio and Computer Club). Phil Bridges, G6DLJ, 9 Hollydene Villas, Southampton Road, Hythe, Southampton SO4 5HU. Tel 0703 847754. Prestel MBX 703847754.

**AMRAC (Essex)**. Dave Hill, G4ODK, 42 Kennedy Ave, Laindon West, Basildon, Essex SS15 6LE. Tel 0268 418058. Prestel MBX 268418058.

**AMRAC (Thames Valley)**. John Linford, G3WGV, 7 Tickenor Drive, Wokingham, Berks RG11 4UD. Tel 0734 733745.

**AMSAT-UK**. Ron Broadbent, G3AAJ, 94 Herongate Rd, Wanstead Park, London E12 5EQ. Tel 01-989 6741. Prestel MBX 019896741.

**BARTG** (British Amateur Radio Teleprinter Group). Mrs Pat Beedie, GW6MOJ, Ffynnonlas, Salem, Llandilo, Dyfed SA19 7NP. Tel 0558 822286.

**Dublin Area Packet Group**. Gerry Lawlor, EI9FV, 137 Gaybrook Lawns, Malahide, Co Dublin.

**MAXPAK** (Midlands AX.25 Packet Radio Group). Andy Witts, G1DIL, 56 Stephenson Drive, Hollin Brow, Perton, Wolverhampton WV6 7YB. Tel 0902 743164. Prestel MBX: 902743164.

**RSGB Repeater Management Group** (Data repeater co-ordinator). Martin Stubbs, G8IMB, Crofters, Harry Stoke Road, Stoke Gifford, Bristol, Avon BS12 6QH. Tel 0272 699352. Prestel MBX 272699352.

**SARUG** (Sinclair Amateur Radio Users Group). Paul Newman, G4INP, 3 Red House Lane, Leiston, Suffolk IP16 4JZ.

**SWAX25** (South-West AX.25 Packet Radio Group). Edward Harland, G3VPF, 3 Randall Close, Chickercell, Weymouth, Dorset DT3 4AS.

## Baudy bits

What is the difference between "bauds" and "bps" (bit/s)? For most amateurs today there is no difference; a 50 baud signal is the same as a 50 bps signal. However, the commercial world has for some time been using various signal encoding techniques which compress high speed data into narrow bandwidth audio channels, and there it becomes necessary to distinguish between bauds and bits. The relevance of this to us is that these techniques are now being implemented in amateur packet tncs, allowing us, for example, to send data at 2,400bps on a standard radio.

To see the difference between bauds and bps, take a look at Fig 1. This shows what happens when a character (the digit "6") is typed at the terminal. First, the binary code for the character (00110110) is sent at a bit rate of 2,400 bps to a special differential phase shift keyed (dpsk) modem in the tnc. The modem breaks down the data into groups of two bits, known as "dibits", and uses each dibit pair to phase modulate an audio signal which is then fed to the transmitter.

There are several standards for phase modulating the audio signal; one of these is shown in the table in Fig 1. Taking our digit "6", the first dibit

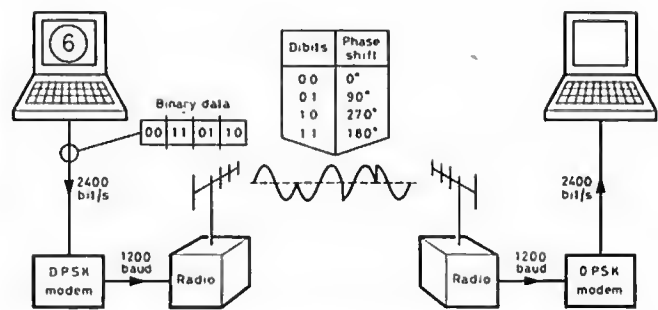


Fig 1. Bauds vs bit/s. The differential phase shift keyed (dpsk) modem splits the 2,400 bit/s data into two bit (dibit) pairs, and each dibit pair then phase modulates the audio input to the radio. The modulation rate is 1,200 phase changes per second; ie the signalling rate is 1,200 baud.

pair is 01 (least significant bit first, remember!), and from the table the phase shift for this pair is 90°. So to transmit these two bits, the phase of the next cycle of audio carrier is shifted by 90° relative to the previous cycle. The next two bits, 10, will cause a relative phase shift of 270°, and so on.

In other words, for each pair of data bits there is only one phase change in the transmitted signal. Thus the signalling rate of the transmitted signal (in bauds) is only half of the data rate (in bit/s). That's the difference.

## Heretical bits

Now that we are approaching the end of the year, perhaps it is time to take stock of where we stand in the world of data comms. A few thoughts come to mind. One of the biggest problems we have to face is the acute shortage of spectrum space, particularly in the rtty and data segments of the bands, and with commercial users looking around intently for more room, it is surely up to us to demonstrate that we are making best use of our frequency allocations. This means that we have to think about how long our transmissions occupy the channel. One way to reduce channel occupancy is to learn to type at a reasonable speed, and to practice *off air*. We cannot afford the luxury of tying up the airwaves for minute after minute, looking for the next letter on the keyboard. Quite apart from that, it is excruciatingly painful to be at the receiving end of such a transmission!

A more fundamental point is the type of signal we transmit. Data comms started a long time ago with rtty, and then graduated to more efficient systems like packet, which only occupy the channel when there is actually something to send. However, packet has not yet replaced rtty, mainly because of the cost; excluding the computer, you can put together a rtty system for a few tens of pounds, whereas packet tnc prices have been as high as £400 plus. But, and this is a big but, this argument has now been turned on its head. Today you can build a full specification AX.25 tnc for around £50, and you don't have to be a computer expert or a packet guru to use it (and you can take as long as you like composing your message without logging the channel). This means that today there is no justification for using rtty at all. Previously, the only good thing you could say about rtty was that it was relatively cheap, but this is no longer true. Years ago, pioneer motorists had to be accompanied by someone on foot carrying a red warning flag—today, of course, almost everyone can drive a car, and the red flag has been consigned to the museum. As we approach 1987, it is time to do the same with rtty.

Also, over the years, cars have been getting faster and faster, and the same goes for packet radio. Today's most common speed on vhf packet is 1,200bps, but already in some parts of this country we are beginning to see what the Americans and the Germans discovered a year or so ago—1,200bps is nowhere near fast enough. Packets sent at this low speed clog up the channel in no time at all, and the race is now on to produce a simple, affordable 9600 bps modem in an attempt to overcome this problem. This also means that the days of packet systems like Cambridge must come to an end very soon. In its heyday a couple of years ago, Cambridge was an interesting and cheap introduction to packet, but it didn't keep pace with the times, and there just isn't room on 144MHz any more for packet systems which lumber along at 300bps! Or maybe you don't agree?

## Final bit

It's hard to believe that this column has now been running for a year, and I have to thank all of you who have contacted me over the months with ideas, news, comments and suggestions. Without exception all this input has been very interesting and useful, and without it this column would have been much harder to put together. Keep it coming, and in the meantime may I wish you all a very happy Christmas, may all your packets be big ones (ouch!), and may 1987 be a successful year for you. □

\* 7 Daubeney Close, Harlington, Dunstable, Bedfordshire LU5 6NF. Prestel Mailbox 219999743

# Contest News

## 144MHz Trophy & SWL Contest results

The results of this contest have been delayed while bad signal complaints are investigated.

## 1986 144MHz Low Power & SWL Contest results

This year's contest was greeted by fair radio and poor weather conditions. This was reflected in the slightly lower total entry than last year. It is interesting to note that entrants to the fixed section exceeded those entering the open section, a rarity in recent years. It was also pleasing to see a bumper crop of SWL entries.

The new Saturday evening timing of the event was appreciated by the majority. This included many fixed stations who commented that it was now possible for them to enter a 144MHz contest as it did not occupy all the daylight hours of a valuable weekend day.

The rules were understood by the majority of entrants. However 12 stations in each transmitting section omitted to claim all the country multipliers available to them. One contestant (unsuccessfully) attempted to claim three multipliers for both G and GW! Both GD, GJ and GU are "double" multipliers, counting as both a county and a country. Those who did not include a separate county check sheet were not credited with any multipliers.

There was only one station reported as radiating poor quality audio. This was remedied during the contest by employing a table as a windbreak and lying down to operate!

Congratulations to the winner in each section; G4NXO, GM0CLN/P and BRS32525, who will receive certificates along with the runners up G6XVV and GW4MGR/P.

G4FRE

FIXED STATIONS									
Posn	Callsign	Score	Mult	OSOs	Cly	Best dx	Km		
1	G4NXO	179,275	71	303	HWR	DJ9UX	703		
2	G6XVV	134,550	75	254	YSS	DF8VK	727		
3	G1GSU	95,744	64	278	BKS	LX2GB	521		
4	G6LOH	88,734	69	220	NHM	GM6LNM	483		
5	G1FKN	83,876	52	203	SXE	G14SOL	---		
6	G8WPD	78,182	62	205	DYS	GM4ZUK/A	422		
7	G6OYL	77,844	52	219	YSS	PA3EFC	458		
8	G4PIO	73,995	52	183	ESX	H89SLU/P	687		
9	G1LDD	62,671	49	141	NLD	G1SVH/P	497		
10	G6HKM	48,603	51	158	ESX	G11JUS	533		
11	G6ATW	47,520	55	177	HFD	G18NBW/P	525		
12	G4NBS	41,310	54	129	CBE	LX2GB	505		
13	G3YDY	40,450	50	135	ESX	G14TAJ/P	550		
14	G1E2S	39,560	46	126	HPH	G1LDD	468		
15	G1GLJ	38,556	51	134	WLT	G1LDD	398		
16	GW6ZUO	33,156	36	153	GWT	FC18BD	503		
17	G0DAZ	31,959	53	101	HWR	GM8BDX/P	394		
18	G8ZRE	29,440	46	116	CHS	G1SVH/P	323		
19	G2BSJ	27,072	48	118	BKS	GM1FML/P	502		
20	G1DWO	26,052	39	126	DOR	GM0CLN/P	464		
21	G8KUC	25,871	41	99	KNT	H89SLU/P	641		
22	G11JUS	24,880	38	58	ATM	G8LNC/P	555		
23	G4TDL	24,255	44	135	BRK	GM0CLN/P	433		
24	G4DFI	22,815	39	128	LDN	GM0CLN/P	451		
25	G14KIS	21,762	39	52	ATM	G1FKN	610		
26	G4FVK	20,925	45	79	CBE	G14TAJ/P	430		
27	G6ZXP	18,081	41	95	WKS	GM0CLN/P	315		
28	G4VFK	17,724	42	82	NHM	GM0CLN/P	275		
29	G4BXN	17,560	40	85	CBE	ON4ADC	340		
30	GW3POM	16,692	39	64	GNM	G14TAJ/P	399		
31	G3WMR	16,146	39	102	KNT	G3IZD/P	383		
32	G8MKD	16,104	44	88	WMD	GM0CLN/P	290		
33	G0ELM	15,725	37	77	ESX	GM4ZUK/A	371		
34	G6FPX	15,120	40	76	MER	GM4ZUK/A	406		
35	G1LPB	15,028	34	99	SFD	G4SSD/P	279		
36	G6HLL	14,801	41	57	CHS	G6ECM	322		
37	G4WOT	14,490	35	66	LNH	G1SVH/P	384		
38	G1GEY	14,223	33	48	TWR	G8LNC/P	482		
39	G0ASA	12,432	37	86	LDN	G8AZA	292		
40	G8VOM	8,800	32	63	LEC	GW6KOC/P	242		
41	G1AMX	7,925	25	33	NLD	G4DDL/P	476		
42	G1PDW	7,564	31	42	ESX	GM0CLN/P	433		
43	G3ERD	7,308	29	58	DYS	G8LNC/P	260		
44	G4PRJ	7,015	36	49	SXE	LX2GB	420		
45	G6NUM	6,634	31	40	NOT	G8LNC/P	269		
46	G4WCJ	6,188	27	33	DOR	GM0CLN/P	473		
47	G4ZNM	5,145	21	41	SXE	GW4CDA/P	401		
48	G0E2L	4,700	25	62	LDN	GW8GIZ/P	---		
49	G31TJP	3,960	22	29	JER	G3AMW/P	539		
50	G2FNK	3,026	17	26	DOR	G1ELC/P	333		
51	G8TZJ	2,268	18	20	LNH	G1SVH/P	407		
52	G4WSL	1,400	35	71	HFD	G18NBW/P	546		
53	G6CZI	1,324	00	152	ESX	DJ0XR/P	531		
54	G3XBY	1,296	00	224	WKS	DC9KU	565		
55	G6MXL	1,200	32	57	DOR	ON6NH	488		
56	G8PGM	1,164	00	203	WMD	GM4ZUK/A	509		
57	G4SND	322	00	72	HWR	G18NBW/P	390		

Posn	Station	Score	SWL Mult	OSOs	Cly	Best dx	Km
1	BRS32525	34,648	52	123	LDN	GM6WDV/P	567
2	BRS25429	30,820	46	90	YSN	ON1CAK	578
3	BRS25243	18,732	42	76	LNH	G1SVH/P	396
4	RS31978	9,190	30	68	ESX	GW4CDA/P	382
5	RS88568	9,042	33	53	DYS	G1FKN	---
6	BRS28198	6,120	24	37	SXE	GW8GIZ/P	350

ALL OTHERS									
Posn	Callsign	Score	Mult	OSOs	Cly	Best dx	Km		
1	GM0CLN/P	274,950	75	329	DGL	GJ4YMX	632		
2	GW4MGR/P	214,887	83	330	CWD	LX2GB	737		
3	G3WOI/P	162,375	75	317	BRK	DD3JN	591		
4	GW4ALG/P	162,260	76	295	GWT	LX2GB	667		
5	G4KZY/P	158,079	79	279	SPE	H89SLU/P	921		
6	G8LNC/P	157,344	66	309	IOW	G18NBW/P	586		
7	G4ILI/P	149,480	74	284	GLR	GM4ZUK/A	578		
8	GW8LNR/P	146,410	55	326	PWS	DJ9UX	707		
9	GW4CDA/P	145,725	67	205	GDD	ON1BW	673		
10	GW8GIZ/P	140,484	69	267	CWD	ON7OU	575		
11	G4FPV/P	128,088	72	289	HWR	F6HEO	694		
12	G4WET/P	114,195	69	289	GLR	LX2GB	603		
13	GW4NVA/P	112,628	74	188	GDD	GM4ZUK/A	429		
14	G1NUS/P	109,968	58	296	CHS	G0AEA	462		
15	G3PMH/P	107,991	71	224	CBE	G0AEA	519		
16	G1SVH/P	107,958	57	257	SXE	G14OPH	560		
17	G4DDL/P	104,065	65	210	DOR	GM1FML/P	588		
18	G8LMW/P	95,178	58	276	LEC	DF9NP/P	616		
19	G3IZD/P	94,340	53	219	CBA	G8DHD	471		
20	G4NOK/P	94,192	56	257	YSW	E15FK	505		
21	G4APD/P	88,507	60	226	NHM	E15FK	502		
22	G1DVU/P	83,904	57	216	SXE	G14TAJ/P	585		
23	G1ELC/P	79,398	66	186	LNH	GJ1TJP	495		
24	G4VAT/P	69,096	56	207	HFD	G14KIS	496		
25	GW1TOA/P	67,430	61	169	DFD	G6ZIC	400		
26	G14TA/P	66,458	47	127	ATM	G1DVU/P	585		
27	G1GVA/P	63,135	61	172	BRK	GM1FML/P	546		
28	G6GS/P	57,134	53	207	HPH	GM3KJF/P	465		
29	G3AMW/P	56,364	44	185	YSN	G4SSD/P	440		
30	G4CRA/P	52,844	44	187	ESX	DG2KBI	431		
31	G4WUS/P	48,532	44	135	CVE	G8LNC/P	441		
32	G6CTU/P	45,619	49	174	SRY	G1LDD	446		
33	G4SLH/P	44,574	51	170	ESX	G0AEA	501		
34	GM1FML/P	40,185	47	75	SCD	G4DDL/P	588		
35	G4ULS/P	38,448	47	160	HWR	GJ1TJP	348		
36	G1FUT/P	37,882	47	115	SFK	LX2GB	464		
37	G3YLE/P	37,345	55	121	BKS	GM1FML/P	527		
38	G4RS/A	36,340	46	94	YSN	G8LNC/P	422		
39	G6ZXN/P	36,260	49	118	WLT	GM8BDX/P	500		
40	G8PCA/A	30,108	39	138	ESX	F1PE1A/A/P	676		
41	G3VEF/P	27,004	43	107	HPH	GM0CLN/P	---		
42	G0CLP/P	18,404	43	82	CHS	G8ZVM	397		
43	G3KOH/P	15,207	37	81	CBA	G1GVA/P	332		
44	G18NBW/P	14,796	27	50	LDR	G8LNC/P	587		
45	G4PDP/A	14,760	40	67	BFD	GM0CLN/P	379		
46	GM4ZUK/A	12,663	27	37	GRN	G4ILI/P	578		
47	G6CSY/P	12,308	34	82	KNT	G3IZD/P	414		
48	G6ZYT/A	11,154	33	90	LDN	G1DOX	340		
49	G1TVF/A	10,540	34	56	BKS	---	---		
50	G6FJF/P	9,152	32	72	NHM	GW4CDA/P	277		
51	F/G6LKB/P	240	3	12	IN97	F6CKR/P	453		

Disqualified: G1RPA (rule 1)

Check logs acknowledged with thanks from PE1EWR, G4FRE and G6DZH.

## VHF NFD

### 70MHz Open Section results

There was an error in the results table of this section. G3MPN should be shown in second place, with G3SYA in third position. Apologies to both stations for this mistake.

### Overall results

Position 13 in the Open Section should read Crawley ARC and Reigate ATS. Apologies to both clubs for this error.

## August 1,296/2,320MHz Contest results

This year's combined microwave contest saw very flat conditions with very few portables out to enjoy the generally very fine weather prior to the Bank Holiday downpour. Most competitors liked the length of the contest but complained about the low activity, especially from the portable stations, possibly the complication of setting up two microwave stations discourages entrants. One group wanted an earlier start to work the "dawn lift", this was tried last year with no sign of increased activity or signal strengths, another did not like the Bank Holiday timing. There were many new entrants this year but some of the regulars were absent. If they return next year the entry and activity in 1987 will be a record.

Congratulations and certificates to the winner, G4FRE, and the runner up, G3XDY, in the Fixed Station section and to the Sheppey Western Group the winner of the All Other Section.

G8TFI

### FIXED SECTION OVERALL RESULTS

		Band position	
Posn	Callsign	1,296MHz	2,320MHz
1	G4FRE	1	1
2	G3XDY	2	2
3	G4NBS	4	---
4	G8GDZ	10	3
5	G4LU	5	---
6	G4RGK	6	---
7	G8HHI	7	---
8	G8CHW	13	4
9	G8NEY	9	---
10	G4FVK	225	14



1,296MHz FIXED SECTION						
Posn	Callsign	Points	OSO	OTH	Power (watts)	Antenna
1	G4FRE	5,698	32	01PX	55	55Y
2	G3XDY	5,579	33	02OB	200	4 x 23Y
3	G6OYL	4,746	30	93JK	40	1.4mD
4	G4NBS	4,142	32	02AF	4	4 x 23Y
5	G4LU	3,833	25	82LT	100	4 x 23Y
6	G4RKG	2,433	17	91ON	32	4 x 23Y
7	G8HHI	2,424	19	91OH	30	15/15Y
8	G8ZOB	2,072	19	92JN	40	27OLY
9	G8NEY	1,888	12	81VK	100	15/15Y
10	G8GDZ	1,829	14	92AK	100	4 x 23Y
11	G8CRN	1,770	17	92SA	5	23Y
12	GW3JXN/A	1,543	7	72SC	60	2 x 23Y
13	G8CHW	1,512	20	91TO	10	48OLY
14	G4FVK	1,280	11	92VN	10	4 x 23Y

1,296MHz ALL OTHER STATIONS SECTION (PORTABLES)						
Posn	Callsign	Points	OSOs	OTH	Power (watts)	Antenna
1	G4NXO	7,025	44	81XW	200	2mD
2	G4ZTR	4,581	26	01PU	50	2.6mD
3	G0AWP	2,971	16	94OA	30	1.2mD
4	GW4WXM	1,600	17	83KA	2	2 x 23Y
5	G6CSY	948	10	01BH	1	23Y

2,320MHz FIXED SECTION						
Posn	Callsign	Points	OSOs	OTH	Power (watts)	Antenna
1	G4FRE	1,854	9.5	01PX	15	1.2mD
2	G3XDY	1,110	9	02OB	7	44OLY
3	G8GDZ	597	5	92AK	25	1.5mD
4	G8CHW	228	4	91TO	0.5	66OLY
5	G8ZOB	98	2	92JN	1.0	27OLY

2,320MHz ALL OTHER STATIONS SECTION (PORTABLES)						
Posn	Callsign	Points	OSOs	OTH	Power (watts)	Antenna
1	G4NXO	1,672	12	81XW	50	1.2mD
2	G4BCH	384	3.5	01PU	4	1.8mD

ALL OTHERS OVERALL RESULTS						
Posn	Group/Entrant	Total points	1,296MHz	2,320MHz	Band position	
1	Sheppey Western CG	2,000	1	1		
2	The Windbreakers	882	2	2		
3	G0AWP/P	423	3	—		
4	Wrexham ARS	228	4	—		
5	G6CSY/P	135	5	—		

## 10GHz Cumulatives 1986 results

This year's cumulatives saw an increase in UK entries in both the wideband and narrowband sections over 1985. However, the small number of narrowband entries is disappointing especially in view of the number of operational stations. Conditions were generally described as poor with one station commenting: "Generally an unlucky selection of Sundays."

In the wideband section, the winner, operating for the first time, operated from sites in Lincolnshire and the summit of Snowdon. From the latter site using 4mW to a 0.5m dish 10 contacts over 120km were made. Operation from Lincolnshire employed a 100mW homebrew locked cavity to a 1.2m dish.

In the narrowband section the winner operating from Hampshire used a G3JVL transverter to a 0.5m dish.

The rules raised comments from only one station who wanted more encouragement given to narrowband stations and a bonus for operating from different sites.

The overall winner, G0BTA, will receive the Alpha Cup and a certificate. Additionally, certificates are awarded to G3PHO (runner-up, wideband) and G3YGF (leading fixed station, wideband; and runner-up, narrowband) and G4ZELM/P (winner, narrowband).

G4FRE

WIDEBAND						
Posn	Callsign	Points	OSOs	Best dx	Km	Location(s)
1	G0BTA/P	2,653	29	G4LFS/P	183	93UK 73XB
2	G3PHO/P	2,280	26	GW3FNO/P	162	93FI, 93BL, 93AD
3	G3ZME/P	2,183	38	G8AFC/P	126	82OL
4	G3NEO/P	1,507	23	G1BHO/P	133	94UI, 93EI
5	G2DSP/P	1,413	33	G3JHM/P	101	90OV
6	G8KOW/P	1,291	26	G3KSU/P	112	00DR
7	G4EFT/P	1,228	31	G3JHM/P	109	90OV
8	G4EML/P	1,215	40	G3JHM/P	120	90SV
9	G3OXL/P	1,092	22	G3PHO/P	82	82WJ
10	G8UDT/P	1,084	37	G3JHM/P	59	91XG
11	G8GKV/P	988	29	G3KSU/P	72	90TV
12	G8CUX/P	970	23	G3KSU/P	112	01AG, 00DR
13	G8BJG/P	934	26	G3KSU/P	83	90VV, 01BB
14	GW6PMC/P	841	11	G8AFC/P	118	83JF, 73UJ
15	G4FPV/P	836	20	G8AGN/P	117	82TC
16	G3XWZ/P	802	20	G3PHO/P	66	93NF
17	G3JMB/P	775	27	G3KSU/P	72	90TV
18	G6KIE/P	570	15	G8UDT/P	59	91XG
19	G1MPW/P	548	13	G8UDT/P	59	91XG
20	G3CU/P	458	8	G6EDB/P	75	91FN
21	G0DJA/P	406	9	G1AEF/P	82	82WJ
22	G3YGF	97	2	G3KSU/P	53	91EA

Checklogs received with thanks from G8UGL and G8MEN

NARROWBAND						
Posn	Callsign	Points	OSOs	Best dx	Km	Location(s)
1	G4ELM/P	660	13	G3JHM/P	125	90MX
2	G3YGF	398	8	F6DPH/P	233	91EA
3	G4EML/P	314	8	G3JHM/P	120	80WP

## July 1986 432MHz Low Power and SWL Contest results

Following the success of the 1985 event this year's contest again proved to be very popular, with a marginal increase in number of entrants. In addition there was a considerable number of non-entrants which contributed to the significantly greater scores achieved. This was in spite of the wet and windy conditions experienced over the country. Operating standards were high and log keeping was good. The timing of this contest met with general approval although one or two entrants would have preferred a later start in view of the midnight finish for the 144MHz contest. However this was countered by one request for an earlier start.

The scoring system is of particular interest with the inclusion of the country/county multiplier. This added interest to the contest and the arrangement used appears to have gained unanimous approval and will no doubt be used again. However two entrants commented that those located on the edge of activity would like to have European "zones" and/or Irish counties included as well.

Some specific comments were: "Very enjoyable contest please do not change the rules, especially the county/country multiplier. Please publish in full, or last four digits, locators to make checking for new sites easier" G5RS/P. "Keep the multipliers, makes the contest much more interesting" G4FOH. "Very nice contest, pity no activity from GM, EI or the continent" G1KDF. (No doubt the few Continental stations on could not be heard in Lancashire.)

Congratulations to the winners, G4NXO and G3WOI/P, to the runners-up, G0ALE and GW4MGR/P, and to the winner of the SWL section, BRS32525, all of whom receive certificates of merit.

G3FZL

FIXED STATIONS						
Posn	Callsign	Points	OSOs	Multi	Loc	County
1	G4NXO	57,252	144	52	IO82LB	HWR
2	G0ALE	37,224	142	47	JO01AH	SRY
3	G4MDZ	25,126	93	34	JO01OC	KNT
4	G8LOH	23,908	102	43	IO92IC	NHM
5	G1DOX	21,988	75	34	IO84JC	CBA
6	G4NBS	17,778	80	39	IO2AF	CBE
7	G1KDF	17,080	59	40	IO33NN	LNH
8	G0ASN	16,560	84	36	JO01GN	ESX
9	G8DCZ	14,091	75	33	IO90VW	SWX
10	G6KHM	11,618	67	32	JO01FT	ESX
11	G4IRX	9,380	63	24	IO92KX	NOT
12	G4FOH	8,497	62	28	JO01BL	LDN
13	G4FJ	8,480	51	29	IO92X1	CBE
14	G4JTJ	7,859	59	32	IO92SD	BFO
15	G3WMR	6,890	59	29	JO01BK	KNT
16	G4BVY	6,672	40	26	IO82TD	HWR
17	G4ULS	6,375	55	24	IO82TP	HWR
18	GW6ZUO	6,240	44	25	IO81PP	GW
19	G5UM	4,225	33	22	IO92MP	LEC
20	G4ZNM	4,104	32	19	JO00BS	SXE
21	G6NUM	3,772	30	23	IO93MA	NOT
22	G0EHV	3,628	19	19	IO84FW	TWR
23	G4VUA	3,318	30	21	IO92OW	LCN
24	G3IGO	3,192	44	21	IO91OF	SRY
25	G4YFN	2,751	45	21	IO91MK	BRK
26	G6HLL	2,700	25	20	IO83RE	CHS
27	G4FVK	2,640	26	20	IO92VN	CBE
28	G6MXL	2,574	27	18	IO80XR	DOR
29	G4HRY	2,260	27	20	IO92GK	WMD
30	G8BRL	1,274	27	14	IO82UI	HWR
31	G6CSY	1,036	20	14	JO01BJ	KNT
32	G8VPE	936	10	8	JO02TP	NOR
33	G8TJZ	460	10	10	IO84OA	LNH

ALL OTHER STATIONS						
Posn	Callsign	Points	OSOs	Multi	Loc	County
1	G3WOI/P	59,340	161	60	IO91GI	BRK
2	GW4MGR/P	49,542	141	46	IO83JA	CWD
3	G1SVH/P	34,440	124	42	JO00BT	SXE
4	GW3CKR/P	32,984	86	38	IO72PT	GDD
5	GW4ZVO/P	31,003	103	43	IO81LR	GW
6	G8LNC/P	28,595	97	43	IO91JO	LOW
7	GW8LNR/P	27,183	106	41	IO81KW	PWS
8	GW4JZF/P	25,857	98	39	IO82JG	PWS
9	G4NOK/P	24,325	107	35	IO93FM	YSW
10	G4FRE/P	22,000	73	40	JO02KD	SFK
11	G4CJG/P	21,411	81	39	IO81FF	SOM
12	G0AMU/P	20,360	89	40	IO83WE	CHS
13	G18ATZ/P	19,108	46	34	IO84XN	ATM
14	G4DDL/P	16,700	66	35	IO80ST	DOR
15	G4XVW/P	15,708	86	34	IO91QJ	WLT
16	GW8GIZ/P	14,552	77	34	IO83JF	CWD
17	G4XOM/P	13,932	83	36	IO82WJ	HWR
18	G5RS/P	13,545	79	35	IO91ME	HPH
19	G4APD/P	12,168	75	39	IO92JH	NHM
20	G6CTU/P	8,820	80	28	IO91KG	SRY
21	G3ZID/P	8,164	44	26	IO84KG	CBA
22	G4VAT/P	7,260	71	26	IO91TW	HFD
23	G1ELC/P	6,175	46	25	IO83TO	LNH
24	G6RCT/P	5,050	42	25	IO91RU	BFO
25	G3GX/P	4,550	38	25	IO93HO	YSW
26	G3AMW/P	3,438	34	18	IO94OA	YSN
27	G3VRC/P	2,970	39	22	IO91RF	SRY
28	G3VEF/P	1,456	31	14	IO91KX	HPH
29	G6ZYT/A	133	11	7	IO91SM	LDN

GW0CV/P was disqualified (Rule 13(b) times not given)  
G0DAZ was disqualified (Rule 1)

SWL SECTION						
Station	Score	OSOs	Loc	Best dx	Km	
BRS32525	11,585	75	JO01AL	G1DOX	365	
BRS52543	4,444	32	IO83LT	G4DFI	354	
BRS28198	1,100	1B	JO00HX	G4NOK/P	310	

Check logs: G6DZH, G8GBY, PE1EWR

## 70MHz Trophy and SWL Contest results

This year's 70MHz Trophy for once saw superb weather and very good tropo conditions, especially for the southern stations. Sporadic E interference caused problems towards the end of the contest but enabled several stations to be heard in West Berlin! GJ3YHU had the best conditions giving many stations a contact with Jersey and without the Es he might have been the overall winner. The excellent tropo conditions may have lowered activity on 70 MHz as some very long dx was being worked on the higher bands, but the stations in the south had the advantage of very high signal levels with none of the long slow QSB normally associated with the band.

Stations in the north generally had flat conditions with many difficult (and sometimes inaccurately logged) contacts, although they all worked some long dx. Indeed, the 733km contact between GM4ZUK/A and G4FRE/P may be a tropo record. Generally, logkeeping standards were very disappointing with the majority of entrants losing points, mainly for incorrect serial numbers. Please take greater care!

Paul McCartney and the bagpipes must be popular, the Mull of Kintyre almost saw three groups operating on it, GW4MGR was concerned it might sink into the sea! GM3TCU decided discretion was the better part of valour and moved north to the Island of Mull, leaving GM4BVY and GM4LIP to do battle.

Equipment used seems almost universally to be MM transverters with either 100W transistor pa's or single 4CX250B amplifiers to run the full legal power. The winners and runners-up in both transmitting sections used the larger amplifiers. Certificates go to GJ3YHU and G4RFR in the fixed station section, BR552543, and to the two Sheppey contest groups sharing the lead, and the VHF Manager's Trophy, in the open section.

G8TFI

### FIXED STATIONS

Posn	Callsgn	Points	OSOs	Locator	Best dx	Km	Ant
1	GJ3YHU	979	72	89WF	GM4LIP/P	720	4ele
2	G4RFR	589	65	90AS	GM4ZUK/A	699	2 x 12ele
3	G4ZAP	479	69	93DC	GM3TCU/P	452	4 x 5ele
4	G3VIP	373	37	93XN	GJ3YHU	503	4ele
5	G3JYP	312	31	84SN	GJ3YHU	575	10ele
6	G3XBY	301	50	92DG	GM3TCU/P	530	5ele
7	G4NBS	285	33	02AF	GM3TCU/P	601	4ele
8	G3XFD	228	33	83RE	GJ3YHU	440	HB9CV
9	GW4HKB	200	29	81KP	GM4BVY/P	442	5ele
10	G3JDM	126	20	82WS	GM4BVY/P	363	4ele
11	GM3TAL	90	10	86GA	G4FRE/P	828	4ele
12	GW4ALG	68	10	81PF	E15WAR/P	282	4ele
13	G4AGO	26	4	91OP	GW4MGR/P	258	X-dipoles
14	G2DHY	15	5	01BK	GW4MGR/P	280	3ele
	G3JKY	15	5	91XK	GW4MGR/P	—	Long wire

### ALL OTHERS

Posn	Callsgn	Points	OSOs	Locator	Best dx	Km	Ant
1	G4FRE/P	1,024	79	70FP	GM4ZUK/A	733	2 x 5ele
	GM4BVY/P	1,024	68	75FI	GJ3YHU	719	2 x 7ele
3	E12CA/P	886	68	62US	G4ZFP	495	6ele
4	GM4LIP/P	786	55	75CH	GJ3YHU	720	2 x 8ele
5	GW4MGR/P	715	89	83JA	GM4ZUK/A	453	8ele
6	G3TZT/P	655	53	95BF	GJ3YHU	687	12ele
7	GW3UAX/P	812	61	71OW	GM4ZUK/A	592	6ele
8	GM3TCU/P	545	30	76AI	G3WBO	680	2 x 6ele
9	G3BPM/P	540	80	80NV	GM3TCU/P	640	4ele
10	G4RIS/P	355	35	01OI	GM4LIP/P	639	3ele
11	GW4CAX/A	283	31	72TV	GJ3YHU	421	4ele
12	GM4ZUK/A	191	13	87WB	G4FRE/P	733	7ele
13	G4TGB/P	155	13	03EF	G4FRE/P	483	Dipole

### SWL SECTION

Posn	Station	Points	OSO's	Locator	Best dx	Km	Ant
1	BR552543	254	32	83LT	GJ3YHU	514	4ele
2	BR528198	89	13	00HX	GW4MGR/P	346	4ele

Checklogs gratefully received from G3YKP and G4NXOIA.

Disqualified: G3GWB/P rule 19 gross errors and E15WAR/P rule 4, all operators must be RSGB members.

## The Golden Anniversary Commonwealth Contest 1987

Participation in this contest will count towards the HF Contest Championship 1986 for UK entrants.

### TRANSMITTING SECTION

1. The general rules for RSGB HF contests, as published in the January 1987 issue of *Radio Communication*, will apply.

2. Date and time. From 1200gmt on Saturday 14 March 1987 to 1200gmt on Sunday 15 March 1987.

3. Sections. Single-operator entries only from members of the RSGB resident in the UK and radio amateurs licensed to operate within the British Commonwealth or British Mandated Territories. Entries from GB, aeronautical mobile or maritime mobile stations will not be accepted. Entries may be single-band or multi-band. Single-band entries should show contacts on one band only; details of contacts made on other bands should be enclosed separately for checking purposes. Multi-band entries will not be eligible for single band awards.

4. Band and mode. A1A only in the 3.5, 7, 14, 21 and 28MHz bands. In accordance with IARU recommendations, contestants are requested to operate within the lower 30kHz of each band, except when contacting novice stations that operate above 21,100kHz and 28,100kHz.

5. Exchange. Contacts may be made with any station using a British Commonwealth call sign, except those within the entrant's own call area. UK stations may not work each other for points. A contact exchange consists of RST and three figure serial number commencing with 001 and increasing by one for each successive contact throughout the contest. Serial numbers when sent from non-competing stations, must be recorded.

### COMMONWEALTH CALL AREAS

The following call areas are recognized for the purpose of scoring in the Golden Anniversary of the Commonwealth Contest, 1987.

A2	Botswana	VP8	S Shetland Is
A3	Kingdom of Tonga	VP9	Bermuda
C2	Nauru	VQ9	Chagos
C5	Gambia	VR8	Pitcairn
C6	Bahamas	V55	Brunei
G/GB/GD/GI/GJ/GM/GU/GW	UK	V58	Hong Kong
H4	Solomon I	VY1	Yukon
J3	Grenade	VU	India
J6	St Lucia	VU7	Laccadive Is
J7	Dominica	VU7	Andaman & Nicobar Is
J8	St Vincent	YJ	Vanuatu
P2	Papua New Guinea	Z2	Zimbabwe
S7	Seychelles	ZB2	Gibraltar
T2	Tuvalu	ZC4	Cyprus (UK Bases)
T30	W Kiribati	ZD7	St Helena
T31	C Kiribati	ZD8	Ascension Is
T32	E Kiribati	ZD9	Tristan da Cunha, Gough Is
V2	Antigua, Barbuda	ZF	Cayman Is
V3	Belize	ZK1	Cook Is
VE1	Maritime Provinces	ZK1	Manihiki
VE1	Sable Is	ZK2	Niue Is
VE1	St Paul Is	ZK3	Tokelau
VE2	Province of Quebec	ZL0	New Zealand
VE3	Province of Ontario	ZL1	New Zealand
VE4	Province of Manitoba	ZL2	New Zealand
VE5	Province of Saskatchewan	ZL3	New Zealand
VE6	Province of Alberta	ZL4	New Zealand
VE7	Province of Br Columbia	ZL7	Chatham Is
VE8	North West Territories	ZL8	Kermadec Is
VK1	Aust Capital Territory	ZL9	Auckland & Campbell Is
VK2	New South Wales	3B6/3B7	Agalega & St Brandon
VK3	Victoria	3B8	Mauritius
VK4	Queensland	3B9	Rodriguez Is
VK5	South Australia	3D2	Fiji
VK6	Western Australia	3D6	Swaziland
VK7	Tasmania	4S	Sri Lanka
VK8	Northern Territories	5B4	Cyprus
VK9L	Lord Howe Is	5H	Tanzania
VK9M	Mellish Reel	5N	Nigeria
VK9N	Norfolk Is	5W	Western Samoa
VK9X	Christmas Is	5X	Uganda
VK9Y	Cocos (Keeling) Is	5Z	Kenya
VK9Z	Willis Is	6Y	Jamaica
VKQ	Heard Is	7P	Lesotho
VKO	Macquarie Is	7O	Malawi
VKO/VP8/ZLS	Antarctic	8P	Barbados
VO1	Newfoundland	8Q	Maldives
VO2	Labrador	8R	Guyana
VP2E	Anguilla	9G	Ghana
VP2K	St Kitts, Nevis	9H	Malta
VP2M	Montserrat	9J	Zambia
VP2V	British Virgin Is	9L	Sierra Leone
VP5	Turks & Caicos	9M2	W Malaysia
VP8	Falkland Is	9M6/9M8	E Malaysia
VP8	S Georgia	9Y	Singapore
VP8	S Orkneys	9V	Trinidad & Tobago
VP8	S Sandwich Is	GB5CC	RSGB HQ Station

6. Scoring. Each completed contact will score five points. In addition, a bonus of 20 points may be claimed for the first three contacts with a Commonwealth call area on each band. Call areas for use in the contest are listed in the accompanying table. All British Isles prefixes (G, GB, GD, GI, GJ, GM, GU, and GW) count as one call area except for the special event station GB5CC. GB5CC will be active throughout the contest and will count as a separate call area for all contestants including those in the UK.

7. Documentation. Separate log sheets (HFC1) for each band must include gmt, call sign of station worked, RST/serial number sent, RST/serial number received and points claimed. Separate band totals should be added together and the total claimed score entered on the cover sheet. It is important that logs are carefully checked for duplicate contacts. Unmarked duplicate contacts for which points have been claimed will be penalised 10 times the number of points claimed, and logs containing in excess of FIVE will normally be disqualified. Your entry should include a signed declaration stating that the rules and spirit of the contest and the terms of the entrant's licence were observed.

8. Name and address for entries. Entries should be addressed to HF Contests Committee, A Gray, G4DJX, PO Box 73, Lichfield, Staffs WS13 6UJ, England. All entries become the property of the RSGB. In the event of any dispute, the ruling of the Council of the RSGB shall be final.

9. Date for entries. Adjudication of this contest will commence on Monday 13 April 1987. Any entry received after this date may be excluded from the contest. Overseas stations are therefore advised to forward their logs by airmail.

10. Awards. To the winner, the Senior Rose Bowl; to the runner-up, the Junior Rose Bowl and to the leading UK station, the Col Thomas Rose Bowl. Certificates of merit will be awarded to (a) first, second and third placings in home and overseas multi-band placings, (b) the leading home and overseas single-band entries on each band; (c) the leading station in each call area. To celebrate the golden anniversary of the contest, four special trophies will be awarded to: (a) the leading UK entrant, (b) the leading non-UK entrant, (c) the leading UK SWL, (d) the transmitting station which, in the view of the RSGB, has contributed the most to the contest since its beginning.

### RECEIVING SECTION

Rules as for the transmitting section except as detailed below:

(a) Only the entrant may operate the station for the duration of the contest. Holders of transmitting licences covering the frequencies below 30MHz are not eligible to take part.

(b) To count for points, a station outside the entrant's own call area must be heard in a contest contact. CQ or test calls will not count for points. A station may be logged only once on each band for the purpose of scoring. When both

stations in contact are heard, they should be logged separately and points claimed for both entries provided that the stations are outside the entrant's own call area.

Each completed log entry will score five points. In addition, a bonus of twenty points may be claimed for the first three stations heard in each British Commonwealth call area on each band. All British Isles prefixes will count as one call area.

A separate log is required for each band. Logs should show the date/time gmt, callsign of station heard, RST/serial number sent by the station heard, callsign of the station being worked and points claimed.

(c) The BERU Receiving Rose Bowl to the winner. Certificates of merit to the leading entrant in each continent.

### First 1-8MHz Contest 1987 rules

1. The general rules for RSGB HF Contests, as published in the Operating Guide supplement, *Radio Communication* January 1987, will apply.

2. Date and time. 2100gmt Saturday 14 February to 0100gmt Sunday 15 February 1987.

3. Sections. Single-operator entries only. British Isles entrants must be members of RSGB. (a) British Isles (b) Overseas (including EI).

4. Band and mode 1820kHz-1870kHz, cw only.

5. Exchange. RST plus serial number starting 001. British Isles stations must also give their county code as shown in the Operating Guide.

6. Scoring.

(a) British Isles section: three points for each completed contact, with a bonus of five points for the first contact with each British Isles county and for the first contact with each country outside the British Isles.

(b) Overseas Section: three points for a contact with a station in the British Isles (not EI), with a bonus of five points for the first contact with each British Isles county.

7. Documentation. Logs to be headed: date/gmt; callsign; RST/number sent; RST/number received; code received; bonus; points. Duplicates must be clearly marked without claim for points. Unmarked duplicates will be penalized at the rate of 10 times number of points claimed, and logs containing more than five unmarked duplicates, for which points have been claimed, would normally result in disqualification. Each entry must be accompanied by a cover sheet and the following signed declaration: I declare that this station was operated strictly in accordance with the rules and spirit of the contest and agree that the decision of the Council of the RSGB shall be final in all cases of dispute.

8. Name and address for entries. Address logs to "HF Contests Committee" as follows: British Isles entrants to J C Burbanks, G3SJJ, "Southlands", 16 Cotgrave Road, Plumtree, Nottingham NG12 5NX. Overseas entrants to PO Box 73, Lichfield, Staffs WS13 6UJ, England.

9. Date for entries. Logs must be postmarked not later than 15 days after the end of the contest.

10. Awards.

(a) The Somerset Trophy will be awarded to the winning station in the British Isles section, and certificates of merit to second and third placed entrants.

(b) The Maitland Trophy will be awarded to the Scottish entrant with the highest aggregate number of points in this contest combined with the Second 1-8MHz Contest 1986.

(c) Certificates of merit will be sent to the first three stations in the overseas section, and to the leading entrant from each overseas country.

(d) A certificate of merit will be awarded to the highest placed log from an entrant who has not entered a First 1-8MHz Contest before. Candidates for this award should mark their entry "First-Time Award".

(e) A certificate of merit will be awarded to the highest placed UK entrant who has reached pensionable age on or before the date of the contest. Candidates for this award should mark their entry "Senior Citizen's Award".

11. Receiving section

(a) Transmitting section rules 1, 2, 3, 4, 6, 7, 8, 9 will apply.

(b) A station may appear only once in the column headed "Station heard". The callsigns of the stations being worked may only repeat once in every three contacts logged. Logs to be headed: date/time gmt; callsign of station heard; RST/serial number/county code sent by that station; callsign of station being worked.

(c) Certificates of merit will be awarded to the leading three entrants.

(d) Holders of UK Class B licences may enter the receiving section.

### CW Cumulative Contests 1987 (1-8, 3-5 and 7MHz) rules

Dates and times:

1-8MHz: Monday 5 January, Tuesday 13 January, Wednesday 21 January and Thursday 29 January. All sessions from 2000 to 2200.

3-5MHz: Sunday 4 January, Saturday 10 January, Sunday 18 January and Saturday 24 January. All sessions from 1000 to 1200.

7MHz: Saturday 3 January, Sunday 11 January, Saturday 17 January and Sunday 25 January. All sessions from 1000 and 1200.

Frequencies: All contacts must be between 1,835 and 1,865kHz, 3,520 to 3,550kHz and 7,015 to 7,040kHz.

Exchanges: Stations may be contacted worldwide. RST followed by serial number (commencing at 001 for each session). Report and serial number (when sent) must be logged. SWL entrants may only log a station once in each session. The RST and serial number sent is to be recorded together with the call of the station being worked. The callsigns of the stations being worked may only repeat in every three contacts logged.

Operators: All operators and swl entrants must be members of the RSGB; clubs entering must be affiliated to the RSGB.

Sections: Single-operator, club (multi-operator) and swl.

Scoring: Three points may be claimed for each completed contact, or swl complete log entry. The total claimed score for transmitting and swl entrants is the sum of the best three sessions for each band entered.

Logs should be sent to RSGB HF Contests Committee, c/o R L Glaisher, G6LX, 279 Addiscombe Road, Croydon CR0 7HY, to arrive not later than 9 February 1987. No declarations are required, but entrants should state the section entered and the date on which they were first licensed. All claimed scores should be totalled for each band.

Awards: A certificate will be awarded for each band to the single-operator entrants with the highest checked score from three of the four sessions. Other certificates will be awarded for the best swl log and to the leading club entrant (subject to there being a minimum of five entrants in these sections), to the single-operator who achieves the best overall performance on all three bands, to the leading old-timer entrant, and to the highest-placed first-time entrant.

### 7MHz 1987 CW Contest rules—correction

The date for the CW contest given in the rules published in the October issue were incorrect. The correct dates are 28th February-1 March 1987. The Phone contest dates are unchanged.

### National Final DF Event 1986 results

The 1986 RSGB National Final Direction Finding Event was organized by Neil Underwood, G4LDR, on behalf of the Salisbury Radio & Electronics Society. Sixteen teams who had previously qualified, assembled at the start, at Salisbury Racecourse, on a bright and hot Sunday afternoon. Also present was the RSGB President, Mr W McClintock, who had travelled from Northern Ireland to see how the "professionals" dealt with finding three hidden stations within four hours.

Good signals were received at the start from all the transmitters, and at 1256 competitors began to leave the start.

Station A was hidden on a steep wooded hillside 15km west of the start near the small village of Ansty. Dummy antennas had been erected but this ploy failed to impede the majority of the competitors.

Station B was 7km east of the start hidden in a small depression among thick undergrowth near the Salisbury to Southampton railway line. This station proved to be the hardest for some competitors caused by the difficulty in obtaining accurate bearings due to the presence of overhead wires.

Station C was located 14km to the north on the southern edge of the small town of Amesbury, the transmitter being hidden in a large culvert which ran underneath a footpath on the bank of the River Avon.

The RSGB President presented the 1950 Council Trophy to Brian Bristow, G4KBB, winner for the second year running. Sir Evan Nepean, G5YN, officiated at the presentation ceremony and also acted as host to the President during the day. The Salisbury Radio & Electronics Society wish to thank all the members who worked so hard to make the event such a success and especially Mrs Pam Lempire and her team of ladies for providing such an excellent tea.

Posn	Name	Club	Time of Arrival		
			Stn A	Stn B	Stn C
1	B Bristow	Mid-Thames	1406	1537	1502
2	M Hawkins	Chelmsford	1539	1434	1403
3	A Simmons	Mid-Thames	1540	1441	1402
4	P Lisle	Mid-Thames	1550	1403	1502
5	D Holland	S Manchester	2119	1530	1611
6	G Whenham	Coventry	1611	1536	1430
7	C Wells	S Manchester	1611	1536	1430
8	R Goodearl	Mid-Thames	1616	1418	1510
9	D Newman	Northampton	1618	1518	1434
10	J Butson	Colchester	1621	1356	1501
11	B Poole	Mid-Thames	1622	1448	1402
12	C Plummer	Mid-Thames	1622	1523	1403
13	T Gage	Mid-Thames	1411	—	1540
14	D Yorke	S Manchester	1419	—	1541
15	F Mephram	Mid-Thames	—	1521	1811
16	W Pechey	Mid-Thames	1439	—	1617



RSGB President Willy McClintock, G3VPK, presenting the 1950 Council Trophy to Brian Bristow, G4KBB, winner of the National DF Final



# Club News

The following is the latest information received by RRs from the RSGB affiliated societies, clubs and groups in time for inclusion in this issue. Basic unchanged information on other affiliated organizations will be published again in January 1987.

RSGB affiliated organizations are requested to report all programmes and new items to their regional representatives regularly. Information for inclusion in the February issue should reach them by 3 December, and for the March issue by 6 January.

Club programmes are given in order of date, subject, time and place of meeting. All callsigns of club secretaries and other contacts are QTHR (correct in the current RSGB Call Book) unless otherwise stated.

All clubs welcome visitors and would be pleased to hear from potential new members.

**REGION 1—RR B Donn, G3XSN, 7 Thurne Way, Liverpool L25 4SQ.**  
Tel 051-722 3644.

**Blackburn (ELARC)—2 Dec (AGM), 7.30pm.** The Conservative Club, Cliff Street, Rishton. Club net on 145-400MHz Wednesday evenings at 9pm. Details G6LXU, tel 0254 887385.

**Bury (BRS)—9 Dec (AGM), 8pm.** The Mosses Centre, Cecil St, Bury. PRO G0CUK, tel Bolton 706191.

**Chester (C&DARS)—2 Dec (Committee meeting), 9 (Construction contest—your questions answered), 16 (Christmas meeting), 23 (Drink & waffle), 30 (Drink and waffle), 8pm.** Chester Rugby Union Football Club, Hare Lane, Vicars Cross, Chester. Details G6IFA, tel 336639.

**Crewe (SCARS)—8 Dec (Annual social evening), 8pm.** LMR Sports Club, Goddard Street, Crewe. Details G1PUV, tel 07816 73185.

**Fylde (FARS)—2 Dec (Equipment Construction Competition), 16 (Hot pot supper at The Club) 7.45pm.** The Kite Club, Blackpool Airport. Sec G8GG, tel 725717.

**Leyland (CLARC)—1 Dec (AFS 144MHz Contest planning/Christmas junk sale), 15 (tba), 8pm.** Morse classes 7.30pm by G4YWG. The Priory Club, Leyland. Details Phil, tel Chorley 74451.

**Liverpool (L&DARS)—2 Dec ("RTTY"), G4IHS, 9 ("Japanese Morse"), G3CSG, 15 (Return to Ellesmere Port quiz), 16 (tba), 23 (Fancy dress or a fine; bring your spouses), 30 (BYOB), 8pm.** The Churchill Conservative Club, Church Rd, Wavertree, Liverpool 15. Sec G1EXJ, tel 728 8811.

**Manchester (SMRC)—5 Dec ("The History of South Manchester Radio Club"), 12 (Technical forum/cilnic, G4SVR), 19 (Christmas party), 26 (No meeting), 2 Jan (Mini lecture contest), 8pm.** Sale Moor Community Centre, Norris Rd, Sale. Details G2AKR.

**Ormskirk (O&DARC)—4 Dec (Practical evening with G4LTI), 8pm.** The Community Centre, Chapel Street, Ormskirk. Sec G1KDF, tel Ormskirk 74868.

**Penrith (EVRS)—19 Dec (Buffet dance at the RAFA club), Details G4XPO, tel Culgaith 462, or G4XET, tel Kirkby Thore 61745.**

**Stockport (SRS)—10 Dec (AGM), 17 (Informal natter night at the bar), 24 (No meeting), 8pm.** The Magnet Inn, Wellington Rd, North, Stockport. Sec G4FFW, tel 061-224 7880.

**Thornton Cleveleys (TCARS)—1 Dec (Construction clinic), 8 (Informal), 15 (Christmas party), 22 and 29 (No meetings), 7.45pm.** 1st Norbreck Scout HQ, Carr Rd. off Fleetwood Rd, Bisham, Blackpool. Details G4BFH, tel 0253 853554.

**Warrington (WARC)—2 Dec ("The 'Chirp-sounder' and frequency management", CPO McDonald from HMS Inskip), 9 ("Computer Security", G3NFB), 16 (Open forum), 23 (Social evening with food, all welcome), 30 (tba), 6 Jan (Open forum) 8pm.** Grappenhall Community Centre, Bellhouse Lane, Warrington. Sec Paul G0CBN, tel 0925 814005.

Thank you to all the members in the region for their support and encouragement during the past 29 months. There are seven months left of my term as RR so if you would like me to visit your club, please contact me.

Wishing you and your families a very happy Christmas and a prosperous New Year. RR1

**REGION 2—RR P R Sheppard, G4EJP, 9 Elvington Crescent, Leconfield, Beverley, N Humberside HU17 7LX.**  
Tel 0401 50397.

**Goole (GR&ES G8HSG)—5 Dec (Natter night), 12 (Christmas night out), 19 (Quiz night) Pavilion, West Park, 26 (Pub night at the Black Swan). Details G8IOH.**

**Halifax (H&DARS G2UG)—16 Dec (Christmas social quiz/pie supper), The Running Man ph, Pelson Lane. Details G0DLM, tel 0422 202306.**

**Hull (H&DARS G3AMW)—19 Dec (Christmas party), Clubroom, Walton Street. Details G0DMP, tel 0482 862149.**

**Maltby (MARS G4SKM)—5 Dec (Activity night on the air), 12 ("Direct conversion receiver for 80"), 19 (Annual Christmas junk sale & buffet), 26 (No meeting). The Community Centre, Clifford Road, Hellaby. Details G1POW, tel 0709 814135.**

**North Wakefield (NWRC G4NOK)—4 Dec (Natter night), 11 (On the air), 18 (Monthly meeting), 19 (Christmas dinner), 25 (Closed). White Horse ph. Details G4RCH, tel 0532 536633.**

**Pontefract (P&DARS G3FYO)—11 Dec (Video—"Visit to China"), 15 (Club party night), 18 (Informal), 8pm.** Carleton Community Centre. Details G0AAO, tel 0977 43101.

**Spen Valley (SVARS G3SVC)—4 Dec ("Breathalyzer" G1DWA), 18 (Anti-Christmas anti-social), 8pm.** Old Bank WM Club, Mirfield. Details G4MLW, tel 0924 409739.

**Todmorden (T&DARS G4WYT)—1 Dec (Christmas social with talk by G3RJV), 15 (Chat night), 8pm.** Queen Hotel. Details G1GZB, tel 070681 7572.

**UK FM Group (Northern G8KFM)—7 Dec (Monthly meeting), 7.30pm.** Royal Hotel, Barnsley. Details G4UNA.

**Waketfield (W&DRS G3WRS)—2 Dec (On the air), 9 (Mastermind quiz), 16 (Bermuda by G4JMT), 23 (Christmas social), 30 (On the air), 8pm.** Community Centre, Prospect Road, Ossett. Details G4VRY, tel 0532 820198.

**WAWNE (Raynet Group G4UWE)—1 Dec (Contest with county Raynet groups), EP Cell, Meaux Road. Details G4EJP, tel 0401 50397.**

**White Rose (WRARS G3XEP)—3 Dec (Natter night), 10 (Video—"Secret Listeners"), 17 (Wine & cheese), Moortown RUFC, Moss Valley. Details G4ATZ, tel 0937 842790.**

**York (YRCA G4YRC)—13 Dec (Club dinner).** Ashcroft Hotel, Bishopthorpe Road. Details G1FTA, tel 0904 704634.

Thanks to White Rose & North Ferriby clubs for their hospitality. Clubs not reported have not forwarded any information to me. Thanks to members of Region 2 for support during the year. Happy Christmas and a prosperous New Year. RR2

**REGION 6—RR N P Taylor, G4HLX, 87 Hunters Field, Stanford in the Vale, Faringdon, Oxon SN7 8ND.**  
Tel 03677 503.

**Didcot (Vale of White Horse ARS)—2 Dec ("The art of QSLing", G5RP), 16 (Christmas social), 7.30pm.** The Waterwitch, Cockroft Road, Didcot. Sec G4SYL, tel Didcot 816845.

**Harwell (HARS)—16 Dec (AGM and video), 7.30pm.** Harwell Lab Social Club. Sec G6MRP, tel Abingdon 848617.

**High Wycombe (Chillern ARC)—10 Dec (Christmas party), Orchard End Country Club, 7.30pm.** Details G4XVP, tel 0494 35275.

**Maldenhead (M&DARS)—4 Dec (Christmas social), 16 (Members quiz), 7.30pm.** Red Cross Hall, The Crescent, Maidenhead. Sec G8RYW.

**Newbury (N&DARS)—9 Dec (Cheese & wine party), 7.30pm.** Newbury Technical College. Sec G3VOW, tel Newbury 43048.

**Oxford (O&DARS)—10 Dec (Natter night), 7.45pm.** No second meeting in December. Oxford Civil Service Sports Association Club, Govt Buildings, Marston Rd, Oxford. Sec G4PUU.

**Oxford (Oxfordshire RAFARS)—10 Dec (Christmas dinner), Sinclairs, Faringdon, 7.30 for 8pm.** Second Sunday monthly (net, 3710kHz), 11.30am. Civil Service Club, Oxford. Area rep G6ZH.

**Reading (R&DARC)—Alternate Tuesdays, 8pm.** White Horse Public House, Emmer Green,

Reading. Mondays (net, 145-325MHz), 7.30pm. Sunday am, monthly (Fox hunt). Details G3YFB.

**Slough (Burnham Beeches RC)—1 Dec (Christmas dinner), 15 (Natter night), 8pm.** Haymills Community Centre, 12 Burnham Lane, Slough. Details G6EIL, tel Maidenhead 25720.

Please note that Dave Chislett, G4XDU, is a new area representative for the Slough/Maidenhead area. RR6

**REGION 7—RR R Sykes, G3NFV, 16 The Ridgeway, Fetcham, Leatherhead, Surrey KT22 9AZ.**  
Tel 0372 372587.

**Ashtford (Echeltord ARS)—15 Dec (Bring and buy sale), 8pm.** The Hall, St Martins Court, Kingston Crescent, Ashtford, Middx. Sec G4VAZ, tel Sunbury 82823.

**Biggin Hill (BHARC)—16 Dec (Christmas dinner), 7.30pm.** Downe Village Hall, 24 High Street, Downe, Kent. Sec G0AMP, tel 0689 57848.

**Cray Valley (CVRS)—4 Dec ("ZL Journey", G3DCC), 18 (Natter night), 8pm.** Progress Hall, Admiral Seymour Road, Eitham SE9. Details G3TAA.

**Crystal Palace (CP&DARS)—20 Dec (Social evening and video show), 8pm.** All Saints Parish Room, Upper Norwood, SE19. Sec G3FZL, tel 01-699 6940.

**Dorking (D&DRS)—9 Dec (Informal evening), 8pm.** Star and Garter Hotel. Sec G3AEZ, tel 0306 77236.

**Kingston (KDARS)—17 Dec (Film show), 8pm.** 3 Berrylands Road, Surbiton. Sec G3ODH, tel Epsom 26005.

**Redhill (RATS)—16 Dec (Constructional contest), 8pm.** Constitutional and Conservative Club, Warwick Rd, Redhill. Sec G8JXV.

**Surrey Raynet—4 Dec (AGM), 5.30pm.** Surrey University, Guildford. Talk-in 144-8MHz FM. Details G8SKK, tel 0483 66962.

**Sutton and Cheam (S&CRS)—19 Dec (Christmas get together), 8pm.** Downs Lawn Tennis Club, Holland Avenue, Cheam, Surrey. Sec G4FKA, tel Epsom 21349.

May I wish all in the region a very happy Christmas and a prosperous New Year. RR7

**REGION 8—RR M Elliott, G4VEC, 20 Haysel, Sittingbourne, Kent ME10 4QE.**  
Tel 0795 70132.

**Brighton (B&DARS)—3 Dec (AGM), 17 (Christmas social), 8pm.** The Seven Furlong Bar, Brighton Race Course. Details G4IIL, tel Brighton 607737.

**Burgess Hill (Mid Sussex ARS)—5 Dec (Christmas social, 7.45pm at La Mirage in The Martlets), 7 (144MHz fixed contest, 9am to 5pm in club shack), 12 (Informal, last meeting of 1986), 15 Jan (Informal), 7.45pm.** Marie Place, Leylands Rd, Burgess Hill. Details G1FRF, tel Hassocks 2937.

**Chichester (CARC)—2 Dec (Club Meeting), 16 (Christmas Social & presentation of the Marcuse Trophy), 7.30pm.** North Lodge Bar, County Hall, Chichester. Details G4EHG, tel Chichester 789587.

**Crawley (CARC)—10 Dec (Fish & chip supper), 8pm.** Crawley Leisure Centre, Haslett Ave, Crawley. Details G4IQM, tel Crawley 882641.

**Dartford (DDFC)—9 Dec (Pre Hunt Meeting), 14 (Dual band hunt), 16 (AGM & Christmas get together), 9pm.** Horse & Groom ph, Leyton Cross, Dartford Heath. No Hunts in January, these will resume in February. Details G8DYF, tel Greenhithe 844467.

**Dover (South East Kent (YMCA) ARC)—3 Dec (Natter nite), 10 ("Weather Satellites", G3EMU), 17 (Christmas social), 7 Jan (Natter nite), Morse Classes will be held every Monday at 7.30pm, RAE Classes will be held each Tuesday evening by G4EGQ.** Club meets every Wednesday 8pm. Dover YMCA, Godwynehurst, Leyburne Rd, Dover. Details John H Dobson, tel Dover 211638.

**Edenbridge (EARS)—10 Dec (Christmas dinner & presentation evening), Scout Hut, High Street, Edenbridge. Details G8VCH, tel East Grinstead 24748.**

**Gillingham (Bredhurst R&TS)—11 Dec ("An hf vertical", G3ZH2), Jan 8 ("Antique Sound Recordings" Colin Johnson from Radio Kent), 8pm.**

Parkwood Community Centre, Parkwood Green, Rainham, Gillingham. Details G0AMZ, tel Medway 376991.

Hastings (HERC)—17 Dec (Christmas social). 7.45pm. West Hill Community Centre, Croft Road, Hastings. RAE Classes 7.30pm start on Thursday, contact G3ZFX, tel Hastings 51011. Sec G4NVQ, tel Hastings 420608.

Horsham (HARC)—4 Dec (AGM). 8 Jan (Home brew evening). 7.30pm. Guide Hall, Denne Road, Horsham. Details G4YFY, tel 0403 87 404.

Maidstone (MYMCAARS)—5 Dec (Natter night RAE), 12 (Construction contest), 19 (Social evening), 26 (No meeting). 8pm. YMCA, Melrose Close, Cripple Street, Maidstone. Details G0BUW, tel 0622 30544.

Margate (Radio Club of Thanet)—9 Dec ("Computers & Amateur Radio"), G4SBD & G6NRU). 8pm. Grosvenor Club, Grosvenor Place, Margate. Details G1HWG, tel 0843 42480.

Meopham (MPRC)—7.30pm. The Club House, Vigo Rugby Football Club, Vigo Village, Meopham. Note change of pro, G6TXX, tel 04352 2403.

Swale (SARC)—7.30pm. Every Monday, Ivy Leaf Club, Dover Street, Sittingbourne. New sec G1JQH, tel Minster 876091.

Tunbridge Wells (West Kent ARS)—5 Dec (Informal), 12 (Christmas Dinner), 19 (Informal), 26 (No meeting). 8pm. Adult Education Centre, Annexe, Quarry Rd, Tunbridge Wells. Details G3XPX, tel 0892 48575.

Worthing (W&DARC)—3 Dec ("Russian Visit", G8FXB), 10 (Ragchew evening and possible antenna talk), 17 (Party night). No Meetings 24 & 31. 7.30pm. Lancing Parish Hall, South Street, Lancing. Details G4SWH, W&DARC, PO Box 599, Worthing BN14 7TT.

REGION 9—RR A H Hammett, Rosehill, Ladock, Truro, Cornwall TR2 4PQ. Tel 0726-882 758.

Axminster (Axe Vale RC)—5 Dec (Annual Dinner), 2 Jan ("Packet Radio", G1DII). 7.30pm. The Cavalier ph, West Street, Axminster. 7.30pm. Sec G3VW, tel 029 74 5282.

Exmouth (EARC)—3 Dec (Christmas Dinner), 17 (Christmas Party at Club Hut). No meeting 31. 7.30pm. The Scout Hut, Marpool Hill, Exmouth. Sec G4RUT.

Redruth (CRAC)—4 Dec (Christmas party). 8 (Computer Section, Christmas natter, bring food and drink). 18 (Constructors' evening). 1 Jan (General monthly meeting). Church Hall, Treleigh, Redruth. Details G4ZUI, tel 0209 860572.

Saltash (SDARC)—5 Dec ("Across the USA by Amtrak"). Slide show by 'Jonah' Barwell-Jones. 19 (Social evening at the Coachmakers Arms, Callington. Families and friends are invited). 2 Jan ("Air Traffic Control", G4ZLO). 7.30pm. Burraton Toc H Hall, Warraton Road, Saltash. Sec G0AKH, tel 075 55 3277.

Torbay (TARS)—13 Dec (Christmas party and inter-club quiz). 7.30pm. ECC Social Club, Ring-slade Road, Highweek, Newton Abbot. Sec G1EUA, tel 062 67 78554.

REGION 10—D H Phillips, GW4KQ, 17 Pentre Gardens, Grange Town, Cardiff CF1 7QJ. Tel 0222 35648.

Bristol Channel Repeater Group (GB3BC)—Subs now due. Contact Sec GW6MBU, tel 0446 711146. Cardiff (CRSGBG)—8 Dec (Christmas social and bring and buy sale). 7.30pm. Pant Mawr Hotel, Tyla-Teg, Pant Mawr Estate, Whitchurch, Cardiff. Sec GW0CUM, tel 04463 3212.

Chepstow (C&DARS)—9 Dec (Guest speaker), 16 (RTTY activity night). Leisure Centre, Chepstow. Contact Sec GW1FJL, tel 02912 2808.

Highfields (HARC)—Thursdays, 7.30pm Highfields Centre for the physically handicapped, Allensbank Road, Cardiff. The club also runs RAE and Morse classes on club nights. An achievement which the club members are proud of is the awarding of membership to the DXCC by the ARRL, one of the few handicap centres to gain this award. Sec GW6ZHM, tel 0222 750315.

Swansea (SARS)—4 Dec (AGM in college house followed by a buffet), 18 (Christmas Team Quiz with prizes). Please note for January '87 only, Meetings 2nd and 4th Thursday. 8 Jan "RTTY/Amor/packet radio", GW4WRD). Lecture Room "N", Applied Sciences Building, Swansea University. Details GW4HSH, tel 0792 404422.

I would like to wish all members of Region 10 Seasons Greetings and a Happy New Year. I also

look forward to meeting you all at the various functions around the region. RR10

REGION 11—RR B H Green, GW2FLZ, 1 Clwyd Court, Tan-y-Bryn Road, Colwyn Bay, Clwyd LL28 4AH. Tel 0492 49288.

Bangor (Dragon ARC)—1 Dec (Social Evening), 15 (Natter night). 7.30pm. Four Crosses Hotel, Pentraeth Road, Menai Bridge, Gwynedd. Sec GW0EGF, tel contact via GW0ABL Llanfairpwll 713647.

Colwyn Bay (Conwy Valley ARC. GW6TM)—11 Dec (Talk by G3CSG), 8 Jan (Home constructors contest). 8pm. Green Lawns Hotel, Bay View Rd, Colwyn Bay. Sec GW4KGI, tel 0745 823674.

Dolgellau (Mellion ARS)—4 Dec (Christmas dinner), 8 Jan (AGM). Dolserau Hall Hotel. Sec GW4KDP.

Portmadog (P&DARS)—18 Dec (Christmas dinner). 8pm at the Harbour Cafe, Ffestiniog Railway, Portmadog. Sec GW1EGO, tel 0766 2684.

Rhyl (R&DARC GW4ARC) 1 Dec (Activity night), 15 (Christmas night out). 7.30pm. 2nd Rhyl Scout HQ, Vale Road, Rhyl. Sec GW1PLI, tel Llandegla 621.

Merry Christmas and a prosperous New Year to all clubs and radio amateurs. RR11

REGION 12—RR M R Hobson, GM8KPH, 17 Well Brae, Pillochry, Perthshire PH16 5HH. Tel 0796 2140.

Dundee (Kingsway Tech ARC)—Tuesdays, 7.30pm. Kingsway Tech Annexe, Grayham St, Dundee. New Sec GM1KJE, tel Dundee 646673.

Kirriemuir (Strathmore ARC)—Dec 8 ("Repeaters", GM8KPH of Perth Repeater Group) 7.30pm. 46 High Street, Kirriemuir. Sec GM3ZXE, tel 082 85 312. Strathmore ARC is the new name adopted by the members at the recent agm of the Forfar & D ARC. The old club callsign etc is being transferred.

1986 has been for this region the year of the expedition. The Lerwick club organized an expedition to the Outer Skerries, requiring the movement of a considerable amount of equipment by boat to the island. The event was also enjoyed by the Islanders without whose help the event couldn't have taken place. The Perth club was also on the move this year with an expedition to Liechtenstein. The visit was enjoyed by all participants, and despite one or two equipment problems, around 180 stations were worked.

To those clubs whom I visited, I would like to extend my thanks for the warm hospitality received; to those I didn't manage to visit, I hope to see you in the coming year. From Janet and myself, may Santa bring you the toys you want, and a prosperous New Year. RR12

REGION 14—RR T G Wylie, GM4FDM, 3 Kings Crescent, Elderslie PA5 9AD. Tel Johnstone (0505) 22749.

Glasgow (WQSARS)—5 Dec ("This is Raynet", GM3ZDH). 7.30pm. 154 Ingram Street, Glasgow. Details GM0EFH.

Motherwell (MLARS)—12 Dec (Junk sale), 19 ("Gordon's Christmas film show", GM3ULP). 7.30pm. Wrangholm Hall Centre, New Stevenson. Details GM1SSA.

Region 14 is proud to host the 1987 Scottish Convention which will be held in the Magnus Sports Centre, Irvine, Ayrshire on Sunday 13 Sept 1987. Details GM0ECU.

I would like to take this opportunity to wish all in Region 14 a very merry Christmas and a very happy and prosperous New Year.

REGION 15—RR R Parsons, 27 Mandeville Avenue, Stratheden Heights, Newtownards, BT23 3XA. Tel 0247 818191.

Ballyclare (E Antrim ARC, GI4KKK)—9 Dec (Social evening). 8pm. Fairview Primary School, Ballyclare. Sec GI4PRH.

Bangor (B&D ARC, GI3XRO)—First Friday in each month, 8pm. New venue, Bangor Rugby Club. Sec GI4OCK.

Belfast (RSGB Group)—17 Dec ("Annual Christmas talk, GI5SJ"). 8pm. 90 Belmont Road, Belfast. AR G16ATZ.

Lisburn (Lagan Valley ARS, GI4GTU)—New venue, Harmony Heights Art Centre, Lisburn. Sec GI4TCS.

All clubs and area reps please note my new address. RR15

REGION 16—RR A Owen, G4HMF, 102 Constable Rd, Ipswich, Suffolk. IP4 2XA

Braintree (B&DARS)—1 Dec (Film show), 15 (Christmas social). 8pm. The Community Centre, Victoria Road (next Bus Station), Braintree. Details G1NBV, tel 0376 44908.

Bury St Edmunds (BSIEARS)—16 Dec (Christmas slide show, G4UCW). 7.30pm. Westgate Primary School (off Hospital Road), Bury St Edmunds. Details Mrs Chris Thorndyke, tel 0359 50271.

Chelmsford (CARS)—2 Dec ("RDE to Radar", B Neale), 6 Jan (Film show). 7.30pm. Marconi College, Arbour Lane, Chelmsford. Details G4KOE, tel 0376 83094.

Clacton (CARS)—New club. 14 Jan (Initial meeting). 7.30pm. Eldorado Club, The Broadway, Jaywick, Essex. Details R Taylor, tel Clacton-on-Sea 430466.

Colchester (CRA)—11 Dec (Films & videos). 7.30pm. Colchester Institute, Sheepen Road, Colchester. Details G3FIJ, tel 0206 851189.

Felixstowe (F&DARS)—1 Dec (Computer evening), 15 Dec (Family social). 8pm. The Scout Hut, Bath Rd, Felixstowe. Details G4YOC, tel 0473 642595 (daytime).

Ipswich (IRC)—10 Dec ("Electric engines & radio signalling", G3JWP). 8pm. Rose & Crown ph, Norwich Rd, Ipswich. Details G4IFF, tel 0473 44047.

Leiston (LARC)—2 Dec ("Smith charts", G3YMA) 7.30pm for 8pm. Sizewell Sports & Social Club, King George's Avenue, Leiston. Details G0CJX, tel 3222.

Loughton (L&DRAS)—5 Dec (Informal). 8pm. Loughton Hall, Rectory Lane, Loughton. Details G4FKI.

Norwich (NARS)—3 Dec ("The story behind the QSL card"), 10 (Film night), 17 (Natter night). 8pm. Valley Drive Community Centre, 97 Plumstead Rd, Norwich. Details G4RKK, tel Wymondham 606979.

Stanford Le Hope (SLH&DARC)—1 Dec ("VHF on the air"), 8 (Power supply project), 15 (Meeting night), 22 (Christmas party), 29 ("Reflections on 1985") 8pm. St Joseph's Parish houses, Scrutton Rd, Stanford Le Hope. Details G4LTH, tel 0375 674301.

Vange (VARS)—4 Dec (Bring and buy), 11 (Film night), 18 (Christmas cheer), 8 Jan (Bring and buy). 8pm. Barstable Community Centre, Basildon. Details Mrs D Thompson, tel 0268 552606.

REGION 17—RR T Emery, Wilverley, Old Lyndhurst Road, Cadnam, Southampton SQ4 2NL. Tel 0703 812435.

Andover (ARAC)—3 Dec (AGM). 8pm. Wolversdene Club, Andover. Club net, 8pm. Tuesday evenings S18—GOARCIA. Sec G0AMO, tel Andover 51593.

Basingstoke (BARC)—1 Dec, (Christmas social). 7.30pm. Forest Ring Community Centre, Sycamore Way, Basingstoke. Sec G4WIZ, tel Tadley 5185.

Bolton (Amateur Radio and Computer Club AMRAC)—5 Dec (Christmas celebration) 9 Jan ("Networking", G8LWC) 8pm. The Bolton Grange Hotel, Bolton, Hants. Sec G6DLJ, tel (0703) 847754 (Also Prestel Mailbox 703847754).

Eastleigh (Itchen Valley ARC)—5 Dec ("Micro-waves", G4YEE). 19 Dec, (Christmas social). 7.30pm. The Scout Hut, Brickfield Lane, Chandlers Ford. Club net, Thursday 8.30pm. S21-23—G6IVR. PRQ G0EQH, tel Winchester 55339.

Fareham (F&DARC)—3 Dec ("Decoding morse with a micro" G6TJT), 17 ("VSWR facts and fallacies" Alan Deelove), 10 (Natter night) Next meeting 7 Jan. Every Wednesday 7.30pm. Portchester Community Centre, Portchester, Hants. Sec G3CCB, tel Fareham 288139.

Liphook (Three Counties ARC)—10 Dec (Quiz night). 13 (Christmas party). 8pm. The Railway Hotel, Liphook. Sec G0BTU, tel Petersfield 66489. New Forest Repeater Group (GB3NF)—For information or to join the group and help support the repeater, please contact G6DLJ, tel (0703) 847754.

Portsdown Hill Repeater Group (GB3PH)—For information or to join the group and help support the repeater, please contact Mr A L G Price, tel (0329) 281852.

Salisbury (SRES)—2 Dec, (Surplus equipment sale), 16 (A talk about "AMRAC"), 13 Jan (AGM). 7.30pm. Grosvenor House, Churchfield Road, Salisbury. Sec G4LDR, tel Amesbury 22809.

Swindon (S&DARC)—4 Dec ("Microprocessors", G6ZCH), 11 (Natter night), 18 Dec (Christmas party). 7.30pm. Oakfield School, Marlowe Avenue, Swindon. Sec G4YQZ.



During the fortieth anniversary day of The Yeovil Amateur Radio Club on Friday 17 October 1986, the Mayor and MP for Yeovil joined in the celebrations. The first meeting was on 17 October 1946 and there are still four founder members. L to r: G4JBH (hidden), G3MYN, G3NOF (founder member), G3GC (secretary), G3OMH (founder member), Mrs Joy Stanton (Mayor), Mr Paddy Ashdown, MP, G3BEC (president and founder member) and BRS10663 (founder member). Photo: G4PDG



At the fortieth anniversary dinner of the Yeovil Amateur Radio Club held on 4 October 1986, the President of the RSGB was presented with a history of the club by the chairman, G4WMV. Photo: G4PDG

**Trowbridge (T&DARC)**—10 Dec (TBA). 7 Jan (AGM). 8pm. Territorial Army Centre, Blythsea Rd, Trowbridge. Please note change of venue. Sec G4SPE tel Trowbridge 4532.

**UK FM Southern Repeater Holding Group (GB3SN)**—For information or to join the group and help support the repeater please contact Mrs Jan Steele tel Fleet 613311.

**Weymouth (SDRS)**—2 Dec ("Christmas Fayre with reminiscences of 25 years of SDRS"). 7.30pm. Royal Engineers Training Camp, Camp Road, Wyke Regis, Weymouth. Sec G1AHK, tel Dorchester 67596.

**Winchester (WARC)**—19 Dec (Christmas party), 16 Jan (AGM) 7.30pm. Durngate House, Winchester. Sec G4ZNO, tel (0703) 772191.

May I take this opportunity of wishing all clubs and area reps in Region 17 a very Happy Christmas and to ask you to make a New Year Resolution to keep your RR informed of your club activities at least eight weeks ahead of the due date! Happy New Year. **RR17**

**REGION 18**—RR Ian Gibbs G4GWB, 61, the Gables, Widdrington, Morpeth, NE61 5QZ. Tel 0670 790090.

**Newcastle (Tynedale ARC-G4ONQ)**—Members and visitors please note secretary's new telephone number. Meetings 1st Tuesday evenings monthly 8.30pm. French Arms ph, Throckley, Newcastle. Sec G0DZG, tel 091 2651718.

**Newcastle (Tyneside ARS-G3ZQM)**—3 Dec ("Amateur radio operation for the visually handicapped", G0DMW), 10 (Activity evening), 17 (Informal). Scout Centre, Harbottle St, Byker, Newcastle. Sec G4KOT, tel 091 2341148.

**REGION 19**—RR R J C Broadbent, G3AAJ, 94 Herongate Road, Wanslead Park, London E12 5EQ. Tel 01-989 6741.

**Cheshunt (CDARC)**—3 Dec. (Natter nite), 10 (TBA), 17 (Cheese and wine plus video), 24, 31 (No meeting). Informal Net on 144.535MHz at 2000 hrs. Meetings are held in the Church Hall, Church Lane, Cheshunt, Herts. 8pm. Sec G4VMR tel Dane End 250.

**Chiswick (ABCARC)**—16 Dec (Discussion on electrical safety). 7.30pm. Chiswick Town Hall, High Road, Chiswick. Sec G3GEH, tel 01-992 3778. **Ealing (E&DARS)**—2 Dec (Solid disc demo of roms, dfs and things for the Beeb) 9 ("DOHFAR, People and Place", G8UBJ), 23 (Christmas Party). The Community Centre, 71A, Northcroft Road, London. Tel 01-997 1416.

**Edgware (E&DARC)**—11 Dec (The grand Edgware junk sale), 25 (No meeting), 8 Jan (AGM). 8pm. The Watling Community Centre, 145 Orange Hill Road, Burnt Oak, Edgware. Sec G4RMD, tel Hatfield 64342.

**Felltham (Thorn EMIARC)**—16 Dec. (Natter nite and Christmas drink), 6.30pm in the Upper bar of the Sports and Social Club, Mono Lane off Victoria Road, Felltham. Sec Dave Austen tel 01-890 3600, ext 2617. Attendance is not restricted to members of Thorn staff.

**Harrow (RSH)**—5 Dec (Activity nite), 12 ("Another story from behind the controls", G3IEE). 8pm. The Roxeth Room, Harrow Arts Centre, High Road, Harrow Weald. Sec G0DIN, tel 01-861 0419. **Harpenden (HARC)**—2 Dec (Nite on air), 16 (Nite on air), 23 (Christmas Party), 30 (Nite on air). 8pm. The Silver Cup ph, Harpenden. No contact given. **Herts (SW Herts UHF Group)**—This group runs GB3MR RB14 and GB3SWM on 10.368GHz at Bushey Heath. The gang are also building a 1.3GHz beacon/repeater GB3BH which should be on air by the time you read this. The group is available to give talks and demos, contact G4KUJ. Donations for the building fund will be gratefully received by G3THQ. The 433MHz repeater, GB3HR, built and maintained by this Group is now into its eleventh year. An Information Sheet is available on request from G4KUJ.

**St Albans (Verulam ARC)**—11 Dec (Activity evening), 16 (AGM, all members should be present at this important evening). 8pm. RAFA HQ, New Kent Road, St Albans, Herts. Christmas rally, Sunday 7 Dec. Hon sec G4OBH, tel St Albans 52003.

**Southgate (SARC)**—11 Dec (AGM. All members should be present to elect your officers for the next term and have a natter with fellow members). 7.30pm Holy Trinity Church Hall, Green Lanes, Winchmore Hill, London, N12. Details G4YLL, tel 0992 30051.

**Uxbridge (Brunel UARS)**—Dec. The shack will be open every lunchtime, behind the Students Union. Basic tuition and Morse classes held. Nets nightly at 8.30pm on 144.710 MHz. Hon sec G6ZYT, tel Uxbridge 39125.

**Welwyn (WHARS)**—1 Dec (AGM. All members should attend this meeting). 15 (Christmas social evening). 8pm. 9th WGC Scouts Hut HQ, Knightfield, WGC Nets held on 144.375MHz Mondays at 8pm. Hon Sec GOAIL, tel 0707 326138.

**Westminster (CSARS)**—Lunchtime meetings at CS Rec Centre, Monck St, Westminster, SW1. 1 Dec ("Radio navigation", John Juleff). 15 (Seasonal social gathering). Shack will be available to licensed members Mon-Fri. 0900-2230.

Stn manager is Bob Treacher, lei 01-212 8823.

**Christmas Greetings** to all club members. To Club Secs, please remember to hand over your job correctly to the next person taking it on, ie club notes have to be in to me at least six weeks before publication dates. Read about it at the start of this month's notes. **RR19.**

**REGION 20**—C R Hollister, 34 Battersby Way, Henbury, Bristol BS10 7SU. Tel 0272 508451.

**Bristol (BRSGBG)**—15 Dec (Christmas party), 7.30pm. Small Lecture Theatre, Queen's Building, University Walk, University of Bristol, Clifton. Details G4SQQ, tel 0272 508451.

**Bristol (North Bristol ARC)**—5 Dec (Natter night and Committee meeting), 12 (Visit and talk by regional representative), 19 (VHF activity night), 2 Jan (Christmas party). SHE 7, Breamar Crescent, Northville, Bristol. Details G4YQQ, tel 0272 690404.

**Bristol (South Bristol ARC)**—3 Dec ("Amateur radio in the 1930s", G5KT), 10 (Video evening, G0DRX), 17 (Christmas families evening), 24 (Christmas Eve club station), 31 (New Year's Eve club station), 7.30pm. Whitchurch Folk House, East Dundry Rd, Whitchurch, Bristol. Details G4RZY, tel 0272 834282.

**Cheltenham (CARA)**—5 Dec (AGM), 12 (Christmas party), 19 (Natter night), 7.30pm. Stanton Room, Charlton Kings Library, Cheltenham. Details G4VXE, tel 0242 26723.

**Gloucester (GARS)**—3 Dec ("Restoration of churches"), 7 Dec (144MHz AFS Contest), 17 (Christmas buffet), 7 Jan (Visit by regional representative), 7.30pm. St John Ambulance HQ, 2 Heathville Rd, Gloucester. Details G6AWT, Tel 0452 504515.

**Weston-super-Mare (WsmARS)**—8 Dec (Constructors night). 7.30pm. The Bristol Hotel, Locking Rd, Weston-super-Mare. Details G1DJW, tel 0934 514429.

**Yeovil (Y&DARC)**—11 Dec ("Preparing for Cycle 22", G3MYM), 18 ("Oscilloscopes 3" G3GC), 1 Jan (Natter night), 7.30pm. The Recreation Centre, Chilton Grove, Yeovil. Details G3GC, tel 0935 75533.

**Congratulations** to the Yeovil & District ARC on their 40th Anniversary. It was a pleasure to meet you all.

Compliments to the members of the South Bristol ARC for their hard work in making the Bristol Radio Rally a great success, and thanks to all the amateurs who supported this new venture for the City of Bristol. **RR20**



# THE Members' Ads PAGES

## FOR SALE .....

YAESU FT101Z, mint condx, used for tvtr only, orig pkg & handbook c/w mic, £375. MMT144/28 tvtr, recently serviced at MH, £60. C1JOU, QTHR, tel: 0322-75275, after 5pm.

HEATHKIT HW12, 80m, mains psu, most new valves, some spares, £75. FT101Z, little used, £380. Kenpro KP-202 2m handheld, nicads, chgr, 4ch fitted, £75. QRT sale as OTH NBC. C4RWL, QTHR, tel: 0228-49655.

CW FILTER 250Hz for Trio TS520 series, £17. ETM-2 keyer, tatty but works FB, £18. Heath pwr txfmr, unused spare for HP-23 psu, all volts for 58-101/HW-101 series, £20 plus post at cost. C3KGB, tel: 082 342578.

TONNA 144MHz 9-ele antenna, new and unused c/w N-type connectors, list £27.78 asking £25 ono. C4JIR, QTHR, tel: 0734-476873.

FRC7700 gen/cov RX, ex condx, can deliver 50 miles radius, £260 ono. Pote, C8WGO, QTHR, tel: 0594-34830.

IG4E 70cm handheld, manual etc, ex condx, can deliver 50 miles radius, £200 ono. Peter, C8WGO, QTHR, tel: 0594-34830.

FT980, £1,000 ono. Complete 70cm F5TV stn, offers? WANTED: T1154 accessories. J Leonard, tel: 021-353 3896.

EODYSTONE main psu 12V o/p for EG10, £15. Bird model 43 thru-line wattmeter modules; 10ff 25-60MHz @ 25W, 10ff 400-1000MHz @ 5W, offers for above or will swap 1 of above for module covering 144-160MHz @ 25W or will purchase. WANTED: auto-atu suitable for FT1 or FT9020M. K Lee, C4HYO, 14 Spring Meadow, off Hollyspring Lane, Bracknell, Berks, tel: 0344 48-3696

COMPLETE STATION: TS8305, VF0120, Yaesu FC707 atu, Shure hand/mic, all manuals incl service manual for TS8305, orig pkg, no time to operate, £775 firm, will not split. G4EEY, QTHR tel: Yateley 876860, evenings.

COMMODORE COMPUTER 3032 c/w C2N cassette recorder, all in vgc c/w lots of software; Wordpro, Assembler, Games, Disassembler & lots more. Also companion 2716/2532 EPROM burner. Offers? Chas, C8BLMA, QTHR, tel: 0224-641695, evenings or 704844 daytime.

ICOM 751 TCVR, AT100, ICP520, 5H6 desk/mic, HM12 hand/mic, manuals & boxed as new, £1,200. C4YYD, QTHR, tel: 061-764 7623 after 5pm.

YAESU FTV901R tvtr modded by SMC for FT102 only, fitted 6m/2m/70cm, built-in psu, complete manual, leads, etc, vgc, £400 ono. C4WZO, QTHR, tel: Herne Bay 374318, evenings.

YAESU FTV107R tvtr, modded for use with FT102, fitted 2m module, vgc, £100. Y0901P monitor scope with bandscope, vgc, all leads, plugs, handbook, £225. 10m FM, JWR2, squelch board plus 25W ps, £30 C4WZO, QTHR, tel: Herne Bay 374318, evenings.

TR10 TS8305 with OFC230 frequency controller vfo, both in first class condx, new 61468s very recently fitted by Lowe, £700, C43NEO, QTHR, tel: 041-639 4078.

WICK, CAITHNESS - Beautifulcroft house with solid fuel c/h and fully dbl/glzd, in 8 acres of land, probably the best permanent site in YS square (YN and W0 under flat condx), offers over £25,000. Alan, CM15ZF, tel: Keiss 351.

8N05 LPM144 linear with switchable preamp, 25W i/p 160W o/p, OK for FM or 558, £175 ex condx, little used, as new. C4W1A, QTHR, tel: 0406 350835, evenings.

FT101E, 250V/12V, CW filter, handbook, no mods, plastic panel cover, £295. C43MHG, QTHR, tel: 0292 311934.

AX25 packet radio unit, £99. FT-703-70cm FM handheld, £150. ARRL Handbook 1985, £3. T. Tugwell 6 Kestrel Drive, Mudeford, Christchurch, Dorset, BH23 4OE, tel: 0202 486344 extn 2223.

K2R1W 1kW 432MHz amplifier built by G41CO. Twin 4CX design c/w fully protected psu. Local delivery available or buyer collects, £525 ovno. Graeme, G6CSY, Orpington, tel: 0689 29230, evenings.

YAESU FT290R, muTek, nicads, chgr, case, YM47 mic, base vertical, mobile mount, 1/4 wave mobile, beam antennas, £285. Briggs, tel: 0532 674720.

RARE OPPORTUNITY to acquire Spectrum 48K with psu and Interface-1 all built into original Fuller FD5 typewriter-style keyboard c/w Microdrive and all in ex wkg order. Tasword 2 and other software incl £75. C3PEK, QTHR, tel: 0244 300897.

FT775 10W 558/CW TCVR, 80m-10m incl new bands c/w CW filter and mic, £365. Psu available if required Also FT290R with nicads and muTek front-end, little used, £250. C3PEK, QTHR, tel: 0244 300897.

COLLINS 390/A, gc, £250. SP600/10 Hammarlund, £120 Marconi Atlanta 16KHz-28MHz, £65. HROMX, 8C34B, £45. R1155 modified. TCS12 TX/RX, CT316 scope, £10 CT53 sig/gen, £20. CR300, £20. VHF marine R/T, new condx, £225. Other W2 gear. SAE to C30VF, tel: 0665 602487.

UNUSED for 7 years, ex-servicio RXs, LF B29, HF B28 Racal RA17 and tuner, £125 ono. Will travel half way to meet buyer. CM4MXW, QTHR, tel: Greta 38271

SONY ICF2001 FM/AM PLL synthesised RX, 150kHz-29.999MHz + 76-108MHz, digital freq display, choice of direct/scan/pre-set/manual tuning, sleep timer, £70. Sony AC122 psu, £16. C3WMO, QTHR, tel: 01-363 5814.

TS520SE 558/CW TCVR, gc, £375 or swap for TS130V. C3HSC Morse records, £3. Sagant trap-dipole 80m/40m/15m/10m, unused, £15. 2off dial type telephones, £5 ea. Prefer buyer collects or transport at cost. C4LKT, QTHR, tel: 01-504 4149.

TR4000A c/w boom/mic, duplexer, antennas, £350. TR2600E handheld, spkr/mic, R/O and whip antennas, base psu/chgr, £270. TL922 linear, less than 4h, £910. Manual for Creed 75s, £5. All with orig pkg, manuals etc. C3KNJ, tel: Watford 44069.

IGDM 701, 10m-160m, 100W, ac psu c/w mic, dc cables, handbook, boxed, vgc, buyer collects OTH or central London, £400. C3ACB, QTHR, tel: 0323-897145

MULTIHOOE FT480R, £275. FT780R, £325. Oressler 0200, £495. 2x4CX250 2m amp, £300. Daiwa CR4P and Multitorque rotator x2 motors, £325. Other misc equip, all vgc, raising funds for house move. Can deliver London area. Morrissey, tel: 01-422 5493.

ACORN COMPUTER, as new, £30. Yaesu SP980 spkr, £45 HMS2 advance Horse trainer, £75. 80m G-whip, £6. Yaesu MD-1 desk/mic, £45. Searanger ship-shore radio, VHF, £140. All gc. C0CAM, tel: 0761-415746.

HANDHELOS: 2off Johnson type 547, 2m FM 2ch 1W o/p 59 fitted to each, gc, nicads, helicals, homebrew chgr, £30 ea or £50 pr incl car if required. Garrey, C4AXDA, QTHR, tel: Bishopton 862875.

OATONG PC1 cvtr, £100. Avo sig/gen CT378A, 2-500MHz, £20. Triplett sig/gen, £5. Avo battery transistor tester, £10. Furzehill 3.5" scope, £10. Txfrms, mains & o/p, good paper weights, free! C4CHG, QTHR, tel: Torquay 37050.

UR43 coax relays, 12V operation, 460MHz, £3.50 ea.

Barnes, C3A05, 14 Coalpit Lane, Langley, Macclesfield, tel: 02605-2287.

HF LINEAR, Yaesu FL2100Z 9-band, little used, £500 or exch solid state HF rig, cash adj either way. Sony ICF2001 RX, 558/AM, 150kHz-30MHz plus FM band £75. Galpin, tel: 0222 623974.

EODYSTONE 680X RX, vgc, £100. Trio TR2400, £100. Boxed 5A RF meter, £5. Workshop manual TR9000, £5. Class 0 manual, £5, operating manuals FT101Z0 FT225R0, £5 ea. Roller coaster, £5. 200pF TX capacitor, £5. Valves, xtals. C310W, tel: Swindon 822055.

YAESU FT209R, NC15 psu/chgr, MH12A28 spkr/mic, PA3 car adaptor, 7/8 mobile whip, slim Jim, 4 months old, selling for £295 saving £105 on new price, orig boxes and instructions. Oavo, C4RSR, QTHR, tel: 0252-873792.

EXCHANGE my FT75B TCVR 5-band, vfo, base psu, mobile psu, 558/CW for electric guitar and amp, does not have to be in mint condition but must be a runner. Ken, C0A51, QTHR, tel: 061-429 6662.

MICROWAVE modules MM2001 RTTY/TV cvtr, all plugs and cables, little used, as new, still under guarantee, £175. Stephens James RX atu, £20. GW4R2U, QTHR, tel: 0437 710544.

PYE OLYMPIC VHF TCVR, as new condx, presently on 70MHz, 8W AM o/p, suitable for 4m or 6m, £30. CH3ZSP, QTHR, tel: 0334 53336.

IC720A vgc, used regularly on amateur bands with gen/cov RX, £550. C0CJU, QTHR, tel: East Grinstead 312374.

FT102, ex condx, 500Hz CW filter + AH/FM board fitted, hardly used, c/w matching spkr 5P102, also ex condx mic, £560 inc carr, no offers. Ian COAYN, QTHR, tel: 0670-813648 extn 27, daytime or 0670-816078 evenings/weekends.

HF TCVR FT200, 80m-10m vgc, £195 ono. Also FDK Multi 700E, 2m FM 25W, vgc, £140 onn. C0FOV, tel: Luton 423495, anytime.

RACAL 1217 solid state RX, matching LF + pan adaptor, MA79N TX exciter, TA9408 11noar amp MA250/ANR synth, all in 19"x19"x22" rack mount c/w handbooks and ccts, vgc, £800 ono. C4XOE, tel: Herne Bay 361585.

YAESU FT276R base stn c/w 2m/70cm modules, mint condx, little used, £950. C80YO, QTHR, tel: Hemel Hempstead 56942.

KW2000E, almost unused, mains psu, manual etc, £250. Lab clearance: freq meters, RF/AF analysers, CLR bridges, psu's, Q meter, decades etc, all at silly prices! Full list available. C3UWA, tel: Sheffield 301214.

USA 1mA meter, 2.75" round body, £3, others. Flexible drives, 7.5", 10.5", m/f ends, 0.25", £2 ea. Yaesu F5P1 8 ohm spkr, £4.50, WANTED: Service manuals for FOK Expander 430 (later model) and 750E. C3MBL, QTHR, tel: 0284-60984.

YAESU 757CX incl MH18, mint condx as sold, genuine reason for sale, £650 incl carr UK, IC215 TCVR, ideal new licensee, £85. WANTED: Jaybeam T81 or similar 1-ele rotatory dipole. No timewasters. Terry N. Kent, tel: 0634 64962.

YAESU FT980 TCVR, CW filters, electronic keyer, ext spkr, Yaesu FC757 auto-atu, connecting cable, mint condx, used for RX only, orig pkg c/w manual £1,200 no offers. C081N, QTHR, tel: 0203 313109.

ROCKWELL COLLINS 1981 commercial rack mount HF communication RX, thumbwheel freq selection down to 10Hz, wkg and c/w orig service manuals. Specification sheet and price on request. Collins, tel: 0225 63232.

IC290E 2m 10W multimode, £320. Orae 13.5V 12A psu, £60. 150W dummy load, £15. Seif 13.5V 3A psu, £15. Adonis MM202HD mobile headset/mic, £15. FX1

wavemeter, £20. Boots CR325 cassette recorder, £15 Jonathan. C4MPH, tel: 0772 435316.

10m/15m/20m BAND MODULE for FT726R, 2 months old, £200 ono or exch for Yaesu 2m or 70cms handle Trio rigs considered. G1EVP, OTHR 5 Manchester, tel: 061-480 1933.

YAESU FRC7700 RX without memory, FRA active antenna, Yaesu FRV type A VHF cvtr, £300 or split. S89 2m RX, £30. Heatkit SW717, £50. Wood, RS86238, tel: Clochan 378.

YAESU FT101E, mint condx, £300. G4VBO, OTHR, tel: Ipswich 719362.

1BAVT/WB-5 10m/15m/20m/40m/80m vertical, two extra sections plus instruction manual, vgc, £85 ovno. G4XAH, OTHR, tel: 0373 63949.

YAESU FT200 without psu, untested but appears OK, £100 ono. C4MBQ, OTHR, tel: 0202 767583.

YAESU FRC8800, £530, Yaesu FRT7700, £30. SWL model C20YM anti-TVI trap dipole, 108ft long, £25. All in mint condx, prices ono. Swan, tel: Worcester 820822, after 7pm.

FT707, AT707, ex condx. FT290, mobile-mount, case, boxed. FT202 xtalld. MMD050/500 freq counter. 19 set, complete. A14 (spares). A13 manpack. R1155E, unmodified. Top-band AH TCVR, 12V. Various ex WD MW2 sets. Fluke DMH 8020A. PFI TCVR, Hightcall on RB10. AR22 2m RX. G4QFO, tel: 01-949 2317.

TRIO TR7730 2m, 25W, mobile mount, complete stn, mag car and home antenna, £170. Variac 44A, 0-270V, £20. Variac 2A, 0-270V, £15. Real to rec1 t/recorder c/w tapes, £10. Carr extra. G3OWS, OTHR tel: 021-475 6267.

OHEGA all-band solid-state broadband HF TCVR, C3MP0 design, full QSK solid-state switching, well constructed and wkg, £300. WAHTEO: Experience construction and use of Heathkit HW5400. Full details G3RPH, OTHR, tel: 0624 842571.

1BAVT vertical antennas, 10m/15m/20m/40m/80m, 10ft as new stainless hardware, £110, 10ft older but gc £65, both plus carr. G4FIV, tel: Launceston 3010, after 6pm or Oakhampston 3131, daytime.

SWAH 500CX TCVR, 80m-10m, gwo, many spares incl AF filter, RIT, semi brook-in, 500W i/p, £180. G3VYI OTHR, tel: 0252 722663.

RACAL RA17L Hk2, £180. FT290 c/w nicads, chgr, only 6 months old, little used, £260. Sommerkamp FP12 psu, 13.8V @ 12A, £60. ATV2 TCVR c/w 20W linear, £70. SBLA144E mulek mast-head preamp, £60. G4HMC, tel: 0524 51896, evenings.

4 x 23-elo Yagis, pwr splitter, stacking frame, w/ separate, offers? WANTED: Bird 43 thraline wattmeter. G4NRC, OTHR, tel: 0277 810831.

FT101 Hk2, 600Hz CW filter and fitted G3LLL clipper, incl SP1018 with 40dB notch filter, all c/w book and G3LLL notes, £225. G2BHI, OTHR, tel: 040481-4359.

WESTERN antenna switch, 5-way HF, 1.2kW, £7.50. Hygain AR40 rotator, c/w cable and controller, £60 K dummy load, 50 ohm, £10. All in ex condx. Sagant broad-band balun, 1kW, 50 ohm, 3-40MHz, new unused, £6. G3YIU, OTHR, tel: 021-430 6926.

70cm ON THE CHEAP! 10ch Pye Westminster W15U FM, 7ch fitted plus preamp, 6W o/p, £100 ono. HHT432/144 2m-70cm tvtr, 10W o/p incl 16dB pad, £100 ono. G0AWL, tel: 0543 262916, after 7.30pm and weekends.

LIHEARS: 2m MH144-505, £70 (11st £106); 70cm MH432-50, £100 (11st £149), both mint and boxed as supplied, few hours use. Reason for sale changing T5780 for T5711E/811E. No offers please. T5780, £745. T5670, £600, both mint. G2FZU, OTHR, tel: Southwell 813847.

PACKET RADIO: AEA PKT-1 packet radio controller, AX25 and VADCG protocols, 300 baud HF and 1200 baud VHF operation, all manuals, as new, hardly used, £175. John, G4SWD, tel: 08926 3485.

48K ZX Spectrum, £60. Interface one, microdrive plus 4 cartridges, £40. Kempston Genronics printer interface, £15. Kempston joystick interface, £10. Software. All vgc. Harry, G00DL, HOT OTHR, tel: 0388 834270, weekends.

YAESU FT208 2m handheld c/w case & helical, £150. Yaesu FT708 70cm handheld, c/w case & helical, £150. Yaesu NC8 AG psu & quick chgr to match, £25 PA-3 car adaptor/chgr, £10. All vgc, boxed c/w instructions. Peter Martin, C45OK, tel: 021-429 7141, weekdays.

HEAVY DUTY tower sections 12', 3off, £40. FTOX401 high pwr TCVR, £150. Top band TCVR 558/CW, £100. Various 10m equip & antennas, all cheap.

Trunkfield, tel: 0908 616726, 6pm-8pm only.

FT290R ex condx, £210. Also BN05 3/50 brand new, £80. G0ERD, OTHR, tel: 0939 32891, evenings.

SOMMERKAMP FT27720 just like the 10120 fitted with fan, DC-cvtr new valves, mic, perfect condx. Buyer tries and collects. Worth looking at, £450 ono. G0CRB, OTHR, tel: Warwick 497497.

ICOM 290E, 144MHz multimode plus mobile bracket & orig box, mobile mic. All 6 months old, £350 ono. David, G4YHV, tel: 0525 222120, evenings.

MOSLEY TA33JNR 3-elo Tribander c/w AR22 rotator & cable, BN86 balun, £75. Electronic keysers Heath HT01410, £45. Katsumi EK150, £85. Altai G00, £30. G3RCU, tel: 0202 475048, after 6pm.

ORAKE 11aar amp and psu, good tubes. Also one new 3-5002, all perfect, £700 the lot. CBLT, OTHR, tel: 0327 860321.

ANTEHNAS: 8-elo cross Yagi, 51m Jim, each with 30' coax, rotator c/w 60' strip and control panel. Cable end mounts and pole, £90. G6LPX, OTHR, tel: 0827 67320, weekends.

T5520 trusty reliable TCVR, fitted with CW filter. Has worked well for years, full spec, no TVI problems. Yours for a mere £295 ono. Richard, C4LPO, OTHR, tel: 0602 818406.

YAESU FT101 TX/RX, good condx c/w spare pa's, no mod, £250 ono. Also Yaesu FR508 RX, £50 ono. G4JUZS, tel: 0222 626065.

DRESSLER 11aar 070 70cms, new, £750. Greed printers 444, 2off c/w workshop manual, £50 lot. Marconi Atlantic HF/RX type EC1838/1 digital c/w manual, £275. Leader OC 4MHz scope, £95. ICS AHT1 as new, £150. C8WYI, OTHR, tel: 0444 450265.

ROBOT 400 sstv pcb c/w xtal instruction book and transfer for front panel layout, £50. G6AFE, OTHR, tel: 0242 576890.

COMMODORE 64 COMPUTER c/w floppy disk drive 1541, datasette unit 1530, programmers ref manual, plus some software. Offers invited. Will deliver London Thames Valley. Bacon, tel: 0753 653866.

TRIO T5130v, £345. Capco 300C atu 1kW, £140. Both items 1207 used since new, therefore mint. Orake K2m low pass filter, £15. G4FPU, OTHR, tel: 0707 320741.

WOBULATOR/AF generator combined, £10. Orake 2-c noise blanker calibrator top band cvtr 0-mult, £140. Rogers control unit, £5. EEG calibration unit, £5. 1/6hp Hoover motor, £5. Oenco coils, 25p ea. Many other items, buyers to collect please. Lindars, tel: 01-647 6157.

COLOUR GENIE computer used once, ready to go on air RTTY CW split screen. Type ahead. Brand new recorder, 8W TV, £130. Will split or exchange for KW2000A or KW2000B, pay difference, Heathkit valve voltmeter. Noel, G3ZLH, tel: Ipswich 49139.

ICOM IC R70 RX, £395. Buyer collects or carr extra G4BGE, OTHR, tel: Bracknell 421502.

MEON 50MHz tvtr, neat but needs alignment, £37 ono WANTED: PS20 for T5120v, swap Trio T5510 + psu for FL101 or TX599, any condx +/- cash. KW Vanguard cheap. Steve, G4EDG, OTHR, tel: Q392 216579, around 6pm.

YAESU FC902 atu, £100. Eddystone EC10 RX, £75. BBC Model 8 computer, £225. Trio TR9000 + PS20 psu + B09 base/SP120 spkr, £375. All fb and boxed. FT227R + mobile-mount, £125. Collection 20 Horse keys all different, £150. G4RRQ, OTHR, tel: 0604 712865, evenings.

HFS 5-band vertical aerial plus radial kit, new & boxed c/w cable, £85. 2m mag-mount, £12. Alloy pole 2" dia, £5. Pair wall brackets 12", £5. PL259 plugs 50p ea. C8HJV, NOT OTHR, tel: Solihull 1707, anytime.

YAESU FT107H warc, one of last made, CW filter, vgc, £450. Hatching FP107E psu/s, £75. Yaesu FL2100Z linear, vgc, £425. Pembroke comms wall-mounted 40ft crank-up lattice tower, winch, rotor cage, £12. G4DBK, OTHR, Ghorley 74451.

DAIWA H00EL GNW 419 antenna tuner, practically new £150 or offers? Brennglass, HOT OTHR, tel: 01-387 1507.

HEWLETT PACKARD 606B & 608F sig/gens c/w synchronizer type 8708A gives 50KHz-480MHz with FH/AM & xtal stability, £400, may split. HP461A 1KHz-150MHz amplifier, £30. Jaybeam 10XY with phasing-harness 2m or 137MHz, £35. John, tel: 01-428 0974.

HEWLETT PACKARD oscilloscopes type 180A, 1801A, 1820A, 50MHz dual-beam, all solid-state, £250. Sig/gen HP3200B 10MHz-500MHz solid-state, small

size 0-120dB attn, vary stable, £150. HP8698A solid-state sweeper plug-in 0.1-110MHz, £200. John tel: 01,428 0974.

TEKTRONIX Spectrum analyzer type 1L20 10MHz-4.2GHz in 5-ranges, solid-state plug-in with main frame & manual, £450. Watkins Johnson yig filter with driver 8-12GHz, £50. Hewlett Packard 0-120dB DC-1GHz attenuator, 10dB steps, type HP3550, £50. John, tel: 01-428 0974.

8BC 015G DRIVE, half height 40T/55, cased, £35. ROMS half price Beebmon, £12. Interword, £25, new unused & boxed. MHT 144/28R 144MHz linear tvtr, 25W o/p. Very sensitive, cost £235, offers £1807 or swap handheld. G4RKO, OTHR, tel: Nantbury 60263.

EX-WO EQUIPMENT: W538 Hk2, R109, W552, W538 AFV, Ho 2A mine det, W531. Swap or offers? All sets work 100%. WANTED: W519 Horse key & any ex-WO equipment that I do not already have. Keith, G4HSF tel: 091-4693955.

FOK PALM512ER 2.2m handheld TX/RX, FM, synthesized nicads, chgr, helical, shift, toneburst, £80 ono. Tim, tel: Yateley 874569.

AR88 working, £40. T/R1985 unmod, manual, £10. Sale 0/8/70 ATC 5qn, RAF Wattisham. Contact G3XLL, OTHR, tel: Hellis 596.

ICOM IC-25E 144MHz FM TCVR, £225 ono. Icom IC-280E 144MHz FM TCVR c/w scanner mod, £150. I6-770 144MHz-430MHz aerial duplexer, £15. CH4AWA, OTHR, tel: 0738 51412.

MATRIX PRINTER on floor stand, programmable form feed, tractors adjustable to 16.5", serial interface 75-600-1200 baud, ex condx, full wkg order, clear upper case print, is ideal for listings etc. Demo available, £50. C3XPY, OTHR, tel: 0562 710313.

ANDREWS HELIAX LOF2-50 quality coax: 50m of new @ £1.75/m; 55m used for 3 months, @ £1.25/m. Major H360 multimode, no mods, easily converted to 10m, £65. Prefer buyer collects. Paul, COCOR, OTHR, tel: Nottingham 725719.

FT757GX TCVR, FC757AT atu, FP757H0 psu, FAS1-4R remote antenna selector, MH18B scanning mic. All vgc, £790. No offers. G3ZYA, OTHR, tel: 0626 62599

O1AHONO CP4 trap vertical antenna, 4-bands 10m-40m £45. Also Jaybeam 10XY, 10ft use only, £20. Jaybeam Q4/2m 4-elo quad, £15. C4PLR, OTHR, tel: Ruislip 635307.

SURELY someone must need an FOK H700EX 2m FM @ 25W ex condx, £120. WANTED: FT225R0 MH 432/50 linear. G3NEW, OTHR, tel: Portsmouth 820315.

RADCOMS, complete copies from about 1970 to date, some bound. All in ex condx. Would prefer not to break up, & suggest that buyer collect. Binders free, £2 per year, carr extra. G3UCI, OTHR.

KF430 70cm mobile c/w bracket & mic, £100 ono. TR2200CX 2m portable c/w bracket & mic, 12-chans & nicads plus VFO-30C & 15W PA type modular electronics HE FM 15-2-P, £125 ono. SEH 70cm pre-amp RF-keyed, £10. MH144MHz 28MHz tvtr, £75 ovno. G3JJI, OTHR, tel: 0920 4316.

KOK 2025E 144MHz-148MHz TCVR in 12.5MHz steps c/w Tronix 13.8v psu regulated. Realistic desk mic, fist mic & tie-clip mic. Mobile mtg bracket. All perfect. Full scanning & 8 memories, £300. G61F, OTHR, tel: 0494 20733.

MH144-1005 11aar amp, ex condx, hardly used, 10W i/p, 65W true o/p switched pre-amp, £75 ono. G62CA OTHR, tel: 0327 50663, evenings.

ORAKE 2B RX c/w manual, £50. AR880 similar, £25. Katsumi EK108A auto-keyer, £30. Astro telescope on tripod, 4" Newtonian reflector, £30. Tascos. All gd wkg condx. Prefer buyer collects. G4FOP, OTHR, tel: Scunthorpe 720794.

AMT-2 TERMINAL UNIT, as new, Amtor, RTTY, CW plus software for Apple micro, £195. Cannon, tel: Southport 69410.

HOKUSHI HFS vertical antenna 80m-10m c/w HFSR radial kit, £65, carr extra or will deliver for petrol. Yaesu Y884 desk mic, PTT and lock, high impedance, £20, post extra. G3ROG, OTHR, tel: 01-455 8831.

3-ELE 20m beam, £50. GOFMP tel: Worksnp 472316.

TRIO/RENNWOOD TS8305 (registered at Lowe's Matlock) c/w mic, manual, pkg case. For further details G4RUO, OTHR, tel: Ghesterfield 36756.

TRIO 670 quad band TCVR with gen BC and FH, £600. Trio 2550 @ 45W 2m TCVR, as new, £250. G3YFO, tel: 0277 823434.

YAESU FT757GX c/w psu, ex condx, never used for transmitting, £650. Andy, G62GF, OTHR.

tel: 0784 259149.

YAESU FT757GA HF TCVR, 18 months old, c/w MH18B mic. As new, little used, £575. Also MH28/432 tvtr complete, £90. Malcom, C14HP, OTHR, tel: 0365 73 685, evenings.

FT227R MEMORIZER VHF FM TCVR recently carefully realigned. SMC scanner board fitted, vgc, c/w manual, mic and mobile mount, £130 ono. C14HA, OTHR, tel: 0429 267442.

JAYBEAM TB3 HF beam, 2 yrs old, £100. Telescopic tower 40' c/w KR400 rotator and fittings, vgc, £200. Rascal RA17 TX, vgc, £100. Buyer must collect C4XY0, tel: Brencley Kent 3263, evenings only.

TR10 599 custom special TX/RX, as new c/w all cables, mic & handbook, £400 ovno. McVicar, tel: 031-665 2420, evenings.

LAR HF atu, £35. C4MH antenna, £35. TTC swr/wave meter, £5. Brass Morse key, £3.50. Philips 06310 cassette recdr, £10. All in ex condx. C3YIU, OTHR, tel: 021-43 6926.

HP5 10m-80m vertical antenna plus HP5R radial kit, boxed and ex condx. Only 6 months Spring & Summer use, £70 ono. COACK, OTHR, tel: 01-845 9575.

SHACK clear out: Switch mode psu 13.5v @ 40A, £50; Toyo 1435 thru-line power meter "N" type connectors, £40 (cost £59); mobile mag mount, £12 (cost over £17). Tony, C6HP0, tel: Southend 351936 NOW!

NATIONAL NC303 communications RX, £50. Acorn music 500, new, £70, 2m-10m cvtr, £5. C3YQC, OTHR, tel: 01-650 9654.

23cm ICOM IC-120 FM TCVR c/w mic, manual & mobile mount, vgc, £400 ono. Keith, C6HS1, OTHR, tel: 0772 653835.

FT790R 70cm multimode c/w FL010 linear, mobile mount, nicads, chrg, carrying case, all as new, £420 ovno. C6XUN, Surrey, tel: 07373 55144.

TSB305 TCVR c/w AT230 atu, VF0240 remote VFO, MC50 desk mic and MC355 noise cancelling fist mic. Beautiful station, £750. Reluctant sale. Could possibly deliver within reasonable radius of Bristol. Colin, C4500, OTHR, tel: 0272 508451.

YAESU FT757GX TCVR, little used, going QRT, £600 ovno. Also other bits & pieces. CAVOH, OTHR, tel: 0606 594719.

MORSE KEY type "O", immac, £30. Jaybeam SPM portable mast, as new, £10. Avo wide range sig/gen 50Kc-8Mc, with book, £12. C2AK, OTHR, tel: Aldridge 52518

ADVENTURER electronic organ, series 100 by Kentucky, 30W per channel, RMS rhythm unit size 45.5W, 27" x 39" H, over £1000 new, accept £550 or would consider exchange for HF equip. Buyer arrange collection. Don, C6CTE, NOT OTHR, tel: 0482 500020.

DRAKE MS4, T4XC, R4C, CW filter, noise blanker, shure desk mic, 2m tvtr, unmarked orig boxes, £475 AT230 unused, still in box, £140. Oras Horse tutor £20. Standard C5B, mobile bracket, antenna mount, 7/8 whip, £190. CAMPC, OTHR, tel: 10W 62476.

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IC700 HF TCVR, separate units, £140. FOK multi 700EX, £130. IC2025 fitted preamp, 144MHz-144.6MHz £110. Pye base RX 6 xtals on 2m FM, £30. All ex condx. Buyer collects or carr extra. Paul, C40KB, OTHR, tel: Billericay 53561.

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55TV Robot, model B0 monitor with circuits, £150. 2 wartime RXs, £5 ea. Txfr 100A 30v centre tapped £30. Sig/gen TF867 15MHz-30MHz, £20. C3IUL, OTHR, tel: 01-890 7091.

RACAL RA117 RX gen/cov 1MHz-30MHz, ex condx, £175 ono. MA79 TX gen/cov, ex condx, £200 ono. Exchange 2m rig possible. C6GYF, OTHR, tel: 0705 373320.

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FT2700RH dual-band FM TCVR, ex condx, £375, post & pkg extra. Row, tel: Gainsborough 5266.

FDK ATC720 Skyvoice handheld airband RX. 720 chann Digital thumbwheel chann selectors, c/w rubber antenna, nicad battery pack, AC chgr, handbook, boxed, 6 months old, hardly used, £110 ono. Aida 103 ssb/CW HF TX/RX. 80m/40m/20m. No psu. c/w mic, mobile mount, handbook, pwr leads. Hardly used, £130 ono. Morrison, tel: 0939 32180.

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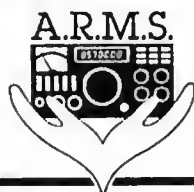
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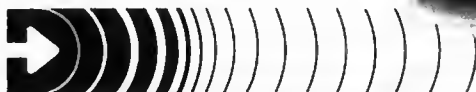
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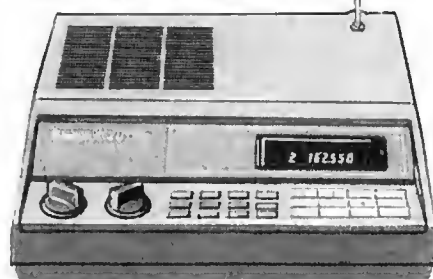
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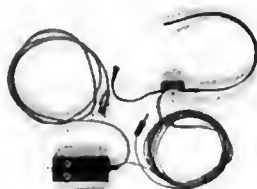
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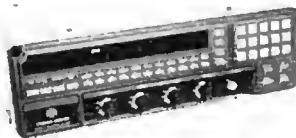
RADIO COMMUNICATION December 1986



# GAREX THE SCANNER SPECIALISTS

## JIL SX-400

### THE PROFESSIONAL SCANNER



- Basic coverage 26-520MHz
- AM, NFM & WFM
- Expandable from 100kHz to 1.4GHz with SSB and CW
- Computer control options
- IF output terminals
- Specifications set by professionals

£649

## REGENCY MX-8000

### THE WIDER RANGE SCANNER

- The receiver with the most Megahertz for your money
- Covers: 25-550MHz, 800MHz-1.3GHz
- AM & NFM & WFM on all bands
- Computer interface socket
- 20 memories
- Compact size
- 12v dc operation
- Up/down step control knob



£487

## REVCO RS-2000E

### THE VERSATILE SCANNER



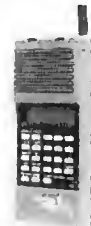
- Covers: 60-180MHz, 380-520MHz
- AM & NFM on all bands
- Search & store of active channels
- Channel activity counter
- 70 memories
- 12v dc & 240v ac

£279

## REGENCY HX-2000E

### THE HAND-HELD SCANNER

- Covers: 60-90MHz, 118-175MHz, 406-496MHz
- AM & NFM on all bands
- Full scan & search functions
- 20 memories
- Nicads, charger & whip antenna included



£279

## JIL SX-200N

### THE SUPERIOR SCANNER



- The choice of the professionals
- Proven reliability
- Covers: 26-88MHz, 108-180MHz, 380-514MHz
- AM & NFM on all bands
- Positive action keyboard
- 16 memories
- 12v dc & 240v ac

£325

## DON'T FORGET THE ANTENNA!

All receivers need a good antenna and the ideal one for a scanner is the REVCOAC, a 16 element disccone. Made in Britain by Revco, a company that has been manufacturing quality antennas for the last 25 years, the REVCOAC covers 50-500MHz, is extremely well made and very good value at just £29.95. Also available - the RADAC dipole, best 25-500MHz with extra performance £69.95.



## PRE-AMPLIFIERS

Broadband antennas usually have no gain, so pre-amps are often desirable. One mounted at the masthead amplifies the weak signals but not the noise generated in the feeder cable. The REVCO PAZ is a low noiseband pass amplifier gives useful gain from 10MHz to over 1GHz. Includes special masthead £49.95. The MUTEK 888A500u is intended for use at the receiver's input. Regulates 12v DC at a few mA £35.50.

## GAREX ELECTRONICS

MAIN DISTRIBUTOR OF REVCO PRODUCTS. PRICES INCLUDE UK P&P and 15% VAT. Ask for details of our interest free credit. Extensive range of PYE radiotelephone spares - S.A.E. for list.

7 NORVIC ROAD, MARSWORTH, TRING, HERTS. HP23 4LS.

Phone 0296 668684. Callers by appointment only.

Phone 0296 668684. Callers by appointment only.

Ask for our list of second-hand scanner bargains.

APPROVED  
**TRIO**  
DEALER

## STEPHENS-JAMES LIMITED

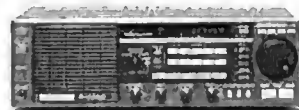
47 Warrington Road, Leigh WN7 3AE (0942) 676790



TRIO TS930S  
HF Transceiver

TS830S	£991.00	PS430	£151.48	AT930	£192.75	TR2600E	£328.00
AT230	£185.98	TL922	£1350.00	AT250	£342.38	TS530SP	£899.82
SP230	£56.00	R2000	£565.32	TS780	£998.00	TR751E	£580.70
VFO230	£318.37	HS5	£32.00	TM201A	£322.68	TS430S	£867.68
TS430S	£967.68	TS711E	£839.96	VC10	£392.82	TS930S	£1595.00
TH21E	£198.00	SW100	£46.81	TM401A	£151.48	TS811E	£998.00
TR751E	£580.70	SW200	£98.50	TH41E	£240.79	TS940S	£1895.00
SW100A	£46.81	SW200	£98.50	TR3600	£353.48	MC50	£43.10
TS440S	£998.00	SWT1	£35.72			MC60A	£77.60

FULL RANGE OF TRIO ACCESSORIES STOCKED



TRIO R2000  
General Coverage Receiver

The only official stockist of Trio equipment in the North West

### STATION ACCESSORIES (inc post)

SWR50 Twin SWR meter	£24.60
Heavy Duty magnetic mount	£22.90
Pair high power antenna traps	£17.25
Heavy Duty dipole centrepiece	£3.95
LF30A Low Pass Filter	£32.00
VHF Wavemeter	£27.75
WELZ SP5M swr/power	£41.00
WELZ SP350 swr/power	£79.00
NS660P 1-8 to 150M SWR/PEP	£99.50
CN419 Antenna tuner	£206.37
CN410M 3-5-150MHz swr	£54.00
CN460M 140-500MHz swr	£58.00
HP4A High Pass Filter	£7.50
AT100 SWL ATU	£59.50
HK608 Morse key	£20.15
Lightweight Antenna Rotator	£49.50
MK704 Twin Paddle	£20.25
Daiwa 30 Amp Power Supply	£200.00
Pair 7.1MHz Antenna Traps	£10.50
HS50B 1:1 Balun	£23.00
Mag Mount - SO239	£15.50
Daiwa 12 Amp Power Supply	£32.00
Full size G5RV antenna	£17.50
Half size G5RV antenna	£16.25
80-10 Trap Dipole Kit	£26.50
Gutter Mount and Lead	£13.50
HK708 Morse Key	£22.00
Pair 3.7MHz Antenna Traps	£10.50

Stockist for Jaybeam, Tonna, Datong, Yaesu, G Whips, Mic Modules, Belcom, Daiwa, Kenpro, AKD, TET, JRC, Pocom.

Full range of aluminium tubing, lashing kits, clamps for the caller

### AR2002 SCANNING RECEIVER

Updated version of the best selling scanning receiver the AR2001. Frequency range 25 to 550MHz plus new band 800 to 1300MHz. Improved keyboard. Front panel knob for frequency stepping. LED "S" Meter. Socket for RS232 interface unit. Specifications as the AR2001. PRICE £487.30



TS430S HF Transceiver

### ANTENNAS

Jaybeam VR3 Vertical	£66.70
Jaybeam TB1 Dipole	£97.75
Jaybeam TB2 Tribander	£195.50
Jaybeam TB3 Tribander	£287.50
Mini Products HQ-1 Minibeam	£199.00
Jaybeam C5/2M Co-linear	£86.25
DCP5 10-80m Vertical	£195.00
GPV-5 2m Co-linear	£54.92
GPV-7 70cm Co-linear	£45.49

Revcone - Disccone antennas and other scanning receiver antennas in stock. Our secondhand stock is one of the largest in the North. Updated daily. Send SAE.

### FULL RANGE OF PUBLICATIONS IN STOCK RSGB, ARRL, ETC.

### THREE NEW MODELS FROM TRIO

TR 751E 2M Multimode—25 Watts or 5 Watt Output Smaller and lighter than the TR9130  
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TS-440S HF Transceiver—INPUT 250 Watts · SSB-CW-FM 100 Watts FM · Two VFO's · 100 Memory Channels. Optional AT440 ATU can be fitted internally heavy duty PS50 Power Supply.  
J.R.C. NRD525 General Coverage Receiver now in stock at £1195.00

TM 211E/411E FM VHF/UHF mobile transceivers  
By taking the popular TM201A and TM401A and adding DCS and a tiltable front panel, TRIO have produced higher specification transceivers. Even easier to fit in tight locations, the TM211E and TM411E are transceivers designed to cope with today's crowded bands.

TM211E . . . £444.60 inc VAT  
TM411E . . . £498.00 inc VAT



## ANTENNA FAULT?

### LOSING DX? NOT getting out?

Check with an **ANTENNA NOISE BRIDGE** and your receiver. **MEASURE** resonance 1-160MHz and radiation resistance 2-1000 ohms, just **TUNE** your receiver and **TURN** the resistance control on the bridge to null the noise, then **SIMPLY READ** resonance from the receiver and resistance from the bridge. **ANSWERS**, no confusion with harmonics, no 10 second limit. **ALSO** measure phasing lines, RF resistance and hence Q of loading coils, preamplifier matching or use as a noise generator. **FUN-TO-BUILD** kit (ready-made to order) only **£24.20** includes ALL parts, case, pcb, pre-wound transformer, by-return postage (Europe same, Giro 21. 923. 4000) and list of other kits.

### CAMBRIDGE KITS

45 (RM) Old School Lane, Milton, Cambridge

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Classified advertisements 40p per word (VAT included), minimum £6.40 Box Number £2.00 extra to wordage or minimum.

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Latest date for acceptance—7 weeks before 1st of issue month.

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Copy and remittance to: **M. J. HAWKINS G3ZNI**, RSGB Advertisements, PO Box 599, Cobham, Surrey KT11 2OE.

Cheques should be made payable to **RSGB**.

Members' Ads must be sent to "Members' Ads," RSGB Hq.

## REG WARD & CO LTD AXMINSTER, DEVON

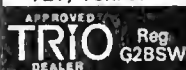


South West's largest Amateur Radio dealer  
Official agent for **YAESU**, **TRIO**, **ICOM**, **FDK**

- Complete range stocked • Full demonstration facilities •
- Mail/telephone orders • Access/Instant credit/Barclaycard •
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Aerials by: **G-Whip**, **Hygain**, **Jaybeam**, **MET**, **Mini Products**, **Revco**, **TET**, **Tonna**.



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## INCREASE IN CLASSIFIED RATE

With effect from the January 1987 issue, the rate for Classified advertisements will be increased to 40p a word (£34.78p + 5.22p VAT). This has been necessitated by the increase in production costs since the rate was last fixed two years ago in January 1985.

## FOR SALE

**OSL CARDS** printed to your own specification on white or coloured gloss card. Send S.A.E. for sample pack to: The Caswell Press, 11 Barons Way, Woodhatch, Reigate, Surrey. (073 72) 44916.

**AMIDON TOROIDAL CORES**, ferrite rings for TVI filters, ferrite beads. Send SAE for data and prices. SMC (TMP Electronics), Unit 27, Pinfold Works, Pintold Lane, Buckley, Clwyd.

**PERSONALISED OSL CARDS**. 1000 £15.00; 5000 £50.00. 5000 gloss in two colours £70.00. Send SAE for samples. [DIY OSL's/SWL's—state which!!—100 mixed designs/colours, £2.50. C.W.O.] O/Cards, 89 Derwent Street, Blackhill, Consett DH8 8LT.

**OSL CARDS**. Gloss or tinted cards. SAE for samples to Twrog Press, Penybont, Gelidau, Blaenau Ffestiniog, Gwynedd.

**ALL THE FAMOUS MOSLEY ANTENNAE**. TA33Jr, Mustang, Atlas, V-3Jr, TD-3Jr Beams, Verticals, etc. Also spares available only direct from us. Send £1 for our Handbook showing all Antennae. Mosley Electronics, 196 Norwich Road, New Costessey, Norwich NR5 0EX.

**WAVEGUIDE, FLANGES & DISHES**. All standard sizes and alloys (new material only) from stock. Special sizes to order. Call Earth Stations, 01-228 7876, 22 Howie Street, London SW11 4AR.

**OSL CARDS**. Try me for quality and price. SAE for samples. A. W. Bailey (G3YNI), Brean Down Press, Wick Lane, Lympham, Somerset.

**G2VF D.I.Y. LOOP ANTENNAS** Long, Medium or Short Wave. SAE details. Rylands, 39 Parkside Avenue, Southampton SO1 9AF.

**"RAYNET" YELLOW REFLECTIVE TABARDS** with "RAYNET" front and rear similar to Police and Ambulance, etc. Also "RAYNET CONTROLLER", 2 sizes. Medium, £8.00; Large, £8.50 inc p&p. Details Mike Watson G8CPH. Ipswich (0473) 831448.

**ANTI-TVI TRAP DIPOLES**, TRAPS for beams, verticals or wire aerials. Batuns. Data sheets 24p SAE. Aerial guide £1. (039 86) 215. G2DYM, Uplowman, Devon EX16 7PH.

**ICOM PORTABLES**. MRZ Desk Top PSU for Icom Portables 2e/4e/O2E/O4E. Incorporating overvoltage protection—overcurrent shutdown—£61.95 + £3.00 (carriage). Models available for PMR/Marine Icoms. MRZ 6amp (continuous) 12v dc.

**PSU** £59.95. MRZ for Icom and Yaesu equipment. MRZ Communications Ltd, 248 Uttoxeter Road, Longton, Stoke-on-Trent, (0782 619658).

**ORP COMPONENTS**. SAE for list, or component guide £1.65 inc p&p. Resistor pack, 60 values, 600 1/4 Watt resistors, £5.45 inc p&p. Cambridge ORP Components, 30 Rookery Close, St Ives, Cambridgeshire PE17 4FX. Tel. (0480) 68330.

**GWM RADIO LTD**. 40/42 Portland Road, Worthing, Sussex. Tel (0903) 34897. Many one off bargains for callers. No lists. Px welcomed.

**G4TJB OSL CARDS**. Personal and standard designs. SAE samples. 100 matt colour DIY £2.50, gloss £3.50. Logbooks £2.20 (mobile £1.20). Buro envelopes £1.00 (20).

**Navy Special**. HF mobile and base station antennas. SAE for details and price list. G. C. Patterson G4TJB, 24 Portlisshead Road, Worle, Weston-super-Mare, Avon BS22 0UX.

**127dB STEP ATTENUATOR**. Good beyond 150MHz, £26.00. Other SWL products. SAE lists. Theasby Electronics, 31 Middleton, Cowling, Keighley, West Yorkshire BD22 0DQ.

**CMOS KEYS, IAMBIC**, dot dash memory insertion and many features. 3 models £26.50, £43.30, £59.95, SAE for details. Chris Thayne, 14 Tynedale Avenue, Whitley Bay NE26 3BA.

**HEAVY COPPER PLATED CHASSIS**, Fingerstock, Cathode/heater connectors: Beryllium copper fingerstock for 4CX250/350 anodes, 7289/3CX100A5 anode and grid. £4.00/ft. Silver plated cathode/heater connectors. £6.30 each. Copper plated K2RW 70CM chassis, also W2GN 2M (2 x 4CX250/350). Fully punched, mesh fitted, £89.00 (p&p £3.00). All parts available. Eht psu's for 4CX range also 7289/3CX100A5. Details and orders to V. Gordon, 113 Pound Lane, Poole BH15 3RS.

**CMOS KEYS, IAMBIC**, dot dash memory insertion and many features. 3 models £26.50, £43.30, £59.95, SAE for details. Chris Thayne, 14 Tynedale Avenue, Whitley Bay NE26 3BA.



## ELECTRONICS (G8AQN)

151a BILTON ROAD, RUGBY CV22 7AS

Tel: Rugby (0788) 76473

**TF144H/4 MARCONI** signal generators 10KHz to 72MHz £85.00, a few need repair £35.00 with manuals.

**PMR ANTENNA's**—7 ele Yagi 145-155MHz 75ohm (Jaybeam) unused £10.00. UHF 460MHz 11 ele Yagi unused £12.00. Mobile 1 wave antenna's cut for 81MHz, can be cut for up to 170MHz £2.50 ea.

145-155MHz 75ohm (Jaybeam) unused £10.00. UHF 460MHz 11 ele Yagi unused £12.00.

Mobile 1 wave antenna's cut for 81MHz, can be cut for up to 170MHz £2.50 ea.

Please note all above items must be collected by arrangement.

**SERVICE MANUALS**—for TEKTRONIX "SCOPEs and plug-ins, plus others send for list. **BOLT-IN FEEDTHROUGH CAPS** 1000pf 500v 2ba thread 50p each, 10 for £4.50. **SOLDER-IN FEEDTHROUGH CAPS** 1000pf 500v 3mm dia 10 for 50p. **SOLDER-IN FEEDTHROUGH INSULATORS** 4mm dia 100 for 75p. **OXLEY PTFE** feedthrough ins 3-5mm dia 6p each, 10 for 50p. 240pf and 500pf bolt-on anode blocking caps 5Kv wkg ideal VHF/UHF valve linear's, £2.50 ea. 'N' plugs 50 ohm right-angle type ex-equip good cond £1.50. **MAGNETIC DEVICES** type 354 aerial 12v relays OK up to 200MHz @ 75 Watts s.p.c.o. £1.75 ea, 2 for £3.00. 2-25pf 10mm dia film trimmers (special offer) 10p ea, 50 for £2.50. 100 for £4.00. Mullard 1-10pf film trimmer 7mm sq 15p ea, 10-80pf compression trimmer P.C. mount OK RF up to 50 Watts 25p. 10-7MHz SSB CRYSTAL FILTERS (loss carrier xtals) £12.00. 10-7MHz SSB crystal filter LSB only, £6.00 both with data sheet. 2-3v 25Ah CYCLOTRON BATTERIES unused list price over £18.00 our price only £5.00 ea. buy six to make nice 13-8v pack £25.00 post up to 2 off plus £2.00 over 2 post paid. **CERAMIC TRIMMERS** 10mm dia 10-40pf tag ends sp offer 10p ea, 15 for £1.00. 2GHz TUNNEL DIODES SFD4-163 £1.00 ea, 4 for £3.00. 3SK97 gasfet £2.20. 3SK81 mosfet 85p. BFR84 mosfet 50p. RF POWER—2N570 24v 25 Watt SSB 30MHz, £5.00. PT4236A 1 Watt 175MHz 12v TO39 case 75p. PT4555 25 Watt @ 144MHz 6db gain 12v £6.00. PT4236C 35 Watt 88MHz 12v 7db gain OK 50MHz £6.00. PT4577 UHF power approx 2 Watt 70cms no info so £1.50 ea. PT 4236B 11 Watt 88MHz 10db gain 12v £4.00. FX1115 beads 10 for 20p.

Many bargains for callers to our shop including loads of test equipment PCBs mixed bags of compts etc plus a complete range of YAESU MUSEN products. Opening times 9.30am to 5.30pm lunch 1.00 to 2.30pm.

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Full PCM range always on demonstration. Many instruments with 16 channel Midi in/out. Multi-timbral address from Midi source. Casio and Yamaha keyboards.

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BISHOPS STORTFORD (0279) 725876



## FOR SALE (continued)

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**PRINTED ADDRESS LABELS** for OSL cards 3p. Stamped SAE details. Mr D. Slack, 34 Cheyney Avenue, Salhouse, Norwich NR13 6RJ.

**MULTI-MEMORY KEYS**, featured Sept/Oct Short Wave. Kil (all board-mounted components, EPROM optional), £29.50. Components/PCBs available separately, SAE to G4DCV, 36 Jubilee Road, Littlebourne, Canterbury CT3 1TP.

**A GUIDE TO HF AMATEUR RADIO** equipment. Giving details of equipment modifications and sources, tests and sources, new and used price guide. £2.50 inc p&p. S. Foster, 91 Copthorne Road, Leatherhead, Surrey KT22 7EF.

**OSL CARDS CLEAR HANGING** display wallets. Hold 20 large size cards. Pack of 3, £2.40. Viola Plastics, 36 Croll Road, Hastings, Sussex.

## RSGB AMATEUR RADIO INSURANCE SCHEME

"ALL RISKS" INSURANCE for portable/mobile/base station amateur radio and ancillary equipment. A service for RSGB members only. Also public liability and equipment insurance for affiliated clubs and societies. Details and leaflets from Nick Gibson, Amateur Radio Insurance Services Ltd, 19 Quarry Street, Guildford, Surrey. Tel: 0483 33771.

## COMPUTER SOFTWARE/HARDWARE

**SINCLAIR OL SOFTWARE:** Morse Tutor, OSO Index, Locator Converter. £5 each, £10 all three. SAE details. Ben Lawrence, 52 Claremont Road, Tunbridge Wells, Kent.

**NEW MODEMS AND COMPONENTS.** SAE please for list. Johns (G8BXO), Three Westpark, South Mollon, Devon EX36 4HJ.

**BBC/ELECTRON:** G4UXD Morse program (review Lopper, June Radcom!). Every possible feature, eg: variable delay; 850 words; extra letter frequency; tests your sending and much more; £5.95 tape, £6.95 disc. D. Brandon, Woodlands Rd, Chesler CH4 8LB.

## HOLIDAY ACCOMMODATION

**FLYING FROM GATWICK?** Stay with G4MGU. Mill Lodge Guest House. 4 minutes from airport. Transport available. Telephone (0293) 771170.

**ANDORRA, PYRENEES.** As a change from working DX, why not be DX. Access by car to 9000 ft. Mediterranean sunshine. Small, friendly, English-run hotel. AA. RAC. Home cooking. Recommended by G4OK, A4XJK, G4WAD and G6JNS. Also French country cottages—Ariege—Pyrenees. Brochure: Terry & Jo Dixon, Hotel Belvedere (RC), Encamp, Andorra. Tel. 01033628 31263.

**CHALETs** (£16-£130). Peaceful, elevated OTH. Central touring, omni DXing. TS830S, Rascal, HW8. GOATS, Chylean, Tintagel, Cornwall PL34 0HH. (0840) 212262.

## MISCELLANEOUS

**COURSE FOR CITY & GUILDS,** Radio Amateurs Examination. Pass this important examination and obtain your licence, with an RRC Home Study Course. For details of this and other courses (GCE, Career and professional examinations, etc) write or phone—THE RAPID RESULTS COLLEGE, Dept JT12, Tuition House, London SW19 4DS. Tel: 01-947 7272 (9am-5pm) or use our 24hr Recordacall service 01-946 1102 quoting JT12.

**HEATHKIT:** UK spares and service centre. Cedar Electronics, Unit 12, Station Drive, Bredon, Tewkesbury, Glos. Telephone (0684) 73127.

**PATENTS/TRADE MARKS AND DESIGN.** Booklets on request. Kings Patent Agency Ltd, Established 1866. (B. T. King MIMech., E. J. B. King, regd Patents Agents)—146a Queen Victoria Street, London EC4V 5AT. Tel: 01-248 6161. Telex 883805.



**AMSAT-UK**

The Radio Amateur Satellite Organisation of the United Kingdom  
Affiliated to the Radio Society of Great Britain  
Technical Journal—OSCAR NEWS

If you would like to know more about amateur radio communication via satellite, why not send a stamped, self addressed envelope to the Hon. Secretary at the address below.

If you send us a £1.00 postal order or cheque we will send you a recent copy of 'OSCAR NEWS' as well as the 'Info. Pack'.

Ronald J. C. Broadbent G3AAJ  
94 Herongate Road, London E12 5EQ

## SUMMER JOBS IN THE USA FOR 1987

American children's summer camps are seeking bright, enthusiastic young people (aged 19½-35) to live with and teach amateur radio skills to children (from mid-June to mid/end August. Return flight, special work visa, food and accommodation arranged PLUS \$300-\$350 pocket money for the season. A challenging and rewarding programme for those who don't mind hard work and who have a genuine regard for children. If you have the relevant experience, and would like further details of this fantastic opportunity to work and travel in the USA (for up to 6 weeks after camp), please contact:

ROD CAROL,  
BUNACAMP, 232 VAUXHALL BRIDGE ROAD,  
LONDON SW1V 1AU. Tel: 01-630 0344.

## Technical Sales Executive

IQD Limited, located in the Somerset town of Crewkerne, manufactures and distributes quartz crystals, oscillators and communications equipment. We are a small, progressive and fast expanding company and our products are sold to electronic equipment manufacturers and communications systems users both here and abroad.

We need an engineer who, after training, will join the sales team to act in a technical liaison role, reacting to customers' enquiries by providing advice to their engineers on the application of products and handling orders from buying departments.

While the position is office based, regular travel is necessary to maintain contact with important customers and to conduct demonstrations and commissioning tests in the field.

Probably over 25, the successful applicant will have a practical working knowledge of electronics, including both digital and continuous wave circuitry: a formal qualification is desirable but not essential and experience of 2-way radio systems would be an advantage.

This is a real career opportunity to progress with this expanding company and remuneration is likely to prove no difficulty for the right applicant; assistance with relocation expenses will be provided if appropriate.



Please send C.V. to: The Development Director,  
IQD Limited, North Street, Crewkerne, Somerset,  
TA18 7AR, England.

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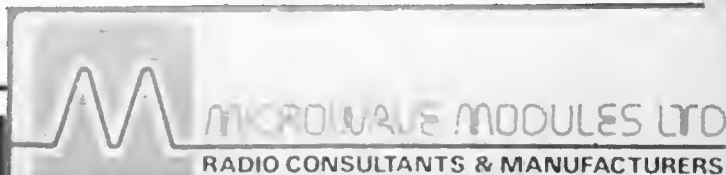
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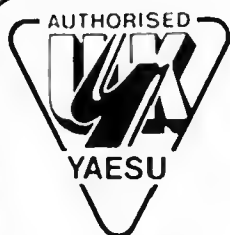
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